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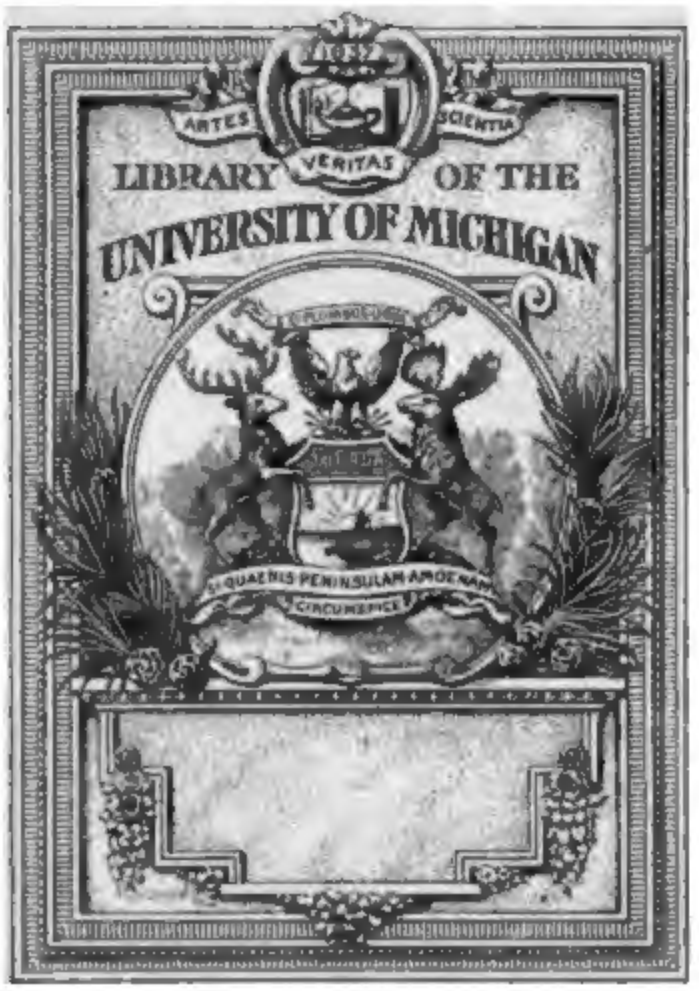

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ANNUAL REPORTS

OF THE

WAR DEPARTMENT

FOR THE

FISCAL YEAR ENDED JUNE 30, 1905.

VOLUME XI.

REPORT OF THE PHILIPPINE COMMISSION.

PART 2.

WASHINGTON:
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1905.

CONTENTS.

	Page.
Report of the Secretary of the Interior	1
Organization of the Department	1
Investigation of unknown islands	3
Board of health for the Philippine Islands	4
Bureau of quarantine service	13
Philippine Civil Hospital	16
Civil sanitarium at Baguio	19
Bureau of forestry	22
Mining bureau	24
Bureau of government laboratories	28
Bureau of public lands	36
Bureau of agriculture	42
Philippine weather bureau	50
Ethnological survey	53
Commercial museum	56
Government of non-Christian tribes	57
Appendix A.—Report of commissioner of public health	63
Statistical tables	124
Report of the chief health inspector for the Philippine Islands	160
Report of the sanitary engineer for the Philippine Islands	174
Report of physician in charge of San Lazaro hospitals	182
Some observations on leprosy in the Philippine Islands and an account of its treatment with the X-ray	186
Report of the physician in charge of Sampaloc Hospital	193
Report of the veterinary division	194
Appendix B.—Report of the board of dental examiners	201
Appendix C.—Report of the board of pharmaceutical examiners	205
Appendix D.—Report of the board of medical examiners	207
Appendix E.—Report of the quarantine service of the Philippine Islands	213
Appendix F.—Report of the Philippine Civil Hospital	245
Appendix G.—Report of the civil sanitarium, Benguet	255
Appendix H.—Report of the chief of the bureau of forestry	265
Appendix I.—Report of the chief of the mining bureau	291
Exhibit A.—Financial statement	311
Exhibit B.—Narrative report of Benguet fieldwork	311
Exhibit C.—Narrative report of work in Batán Island	312
Exhibit D.—Report upon the Bulacan iron industry	315
Exhibit E.—Report upon building stone near Manila	321
Appendix J.—Report of the bureau of government laboratories	329
Report of the librarian	340
Report of the director of biological laboratory	348
Report of the chemical laboratory	358
Report of the serum laboratory	361
Report of the botanist	368
Report of the engineer	374
Report of the chief clerk	375
Appendix K.—Report of the bureau of public lands	379
Appendix L.—Report of the Philippine weather bureau	391
Appendix M.—Report of the ethnological survey	417
Report of Mr. Christie's visit to the Subanos	424
Report of the commercial museum	425

Pag

Appendix N.—Report of the chief of the bureau of agriculture..... 42
Exhibit A.—Report division of fiber investigations..... 4
Exhibit B.—Report division of seed and plant introduction..... 4
Exhibit C.—Report of Batangas experimental station..... 4
Exhibit D.—Report of the government rice farm..... 4
Exhibit E.—Report of La Carlota experiment station..... 4
Exhibit F.—Report of the government stock farm, Baguio..... 4
Exhibit G.—Report of La Trinidad experiment station..... 4
Exhibit H.—Report of the San Ramón farm..... 4
Exhibit I.—Report of an experiment in growing Sumatra tobacco..... 4
Exhibit K.—Report of the Singalong experiment station..... 4

SIXTH ANNUAL REPORT

OF THE

PHILIPPINE COMMISSION.

REPORT OF THE SECRETARY OF THE INTERIOR.

DEPARTMENT OF THE INTERIOR,
Manila, P. I., October 20, 1905.

GENTLEMEN: I have the honor to present the fourth annual report of the operations of the department of the interior. Unless otherwise expressly stated, it covers the year ending August 31, 1905.

ORGANIZATION OF THE DEPARTMENT.

Some radical changes have been made in the organization of the department by Act No. 1407, passed on October 26, 1905. The civil sanitarium at Baguio, the civil hospital at Manila, and the board of health have been combined as a single bureau, known as the bureau of health, which has been given sanitary supervision over Bilibid Prison and over all insular prisons and penal settlements in the provinces. The ethnological survey has been abolished as a separate bureau and its work has been combined with that of the bureau of education, and the mining bureau and the bureau of laboratories have been combined to form the bureau of science, so that the bureaus of the department as at present organized are the bureau of health, the bureau of the quarantine service, bureau of lands, bureau of forestry, bureau of agriculture, bureau of science, and the weather bureau.

I believe that increased efficiency and reduced expenditure will result from the fusion of the civil hospital and the civil sanitarium with the bureau of health. It has frequently been necessary for these institutions to call upon the board of health for assistance when work was especially heavy. The board of health was already operating a number of hospitals and the force employed at these several institutions can be used to the best advantage at one or another of them as occasion may require if under the control of a single chief. Economy in clerical force and in the purchase of supplies will also result.

The consolidation of the mining bureau with the bureau of laboratories will solve in a measure the troublesome question of suitable quarters for the officers and employees of the former bureau. Unfortunately the new laboratory building does not afford adequate space for exhibiting the collections of the mining bureau. It is thought, however, that the working collections may be accommodated there and that the collection intended primarily for exhibition may be left in the old mint building, to which the collections of the ethnological survey might well be transferred.

It is hoped that the storing of any part of the mineralogical collections may be avoided, as there is more or less constant necessity for examining many of the specimens, and this would involve great loss of time and inconvenience were they packed up. The scientific men of the mining bureau will now be freed from the necessity of performing a large amount of administrative work in connection with property returns, requisitions, civil-service records, and appointments, and will have their time free for work in the field or upon the material which they gather. While at Manila they will be in the building where the general scientific library is housed and where their assaying and analytical work is performed.

It should be clearly understood that the fusion of the mining bureau with the bureau of government laboratories does not reflect in any way on the manner in which the operations of the mining bureau have been conducted, nor does it indicate any intention on the part of the insular government of decreasing the work done to stimulate the development of the mineral resources of the Philippines. The operations of the mining bureau have been conducted in a most efficient and economical manner, and the transfer has been made solely in order to secure economy in administration and to leave the technical men of the bureau free to perform technical work. More should be accomplished during the coming year than during any preceding year in the history of the mining bureau.

Supervision and control of non-Christian tribes outside the Moro Province has by Acts Nos. 1396 and 1397 been given to the secretary of the interior, while at the same time the work of the ethnological survey has been transferred to the bureau of education. This change has been made in order that the survey may utilize during the vacation period of each year the services of school-teachers who are generally distributed throughout the archipelago. The new arrangement is open to the objection that it removes from the department charged with the supervision and control of non-Christian tribes the only agency which now exists for gathering information regarding them and for investigating the practical operations of the special laws enacted for them, except in so far as investigations can be made by the secretary of the interior in person. It remains to be seen whether the increased amount of information gathered through the bringing of school-teachers under the immediate control of the officer in charge of the ethnological survey work will compensate for the difficulties necessarily involved in this arrangement. In view of the experience of the Smithsonian Institute in attempting to use school-teachers for ethnological work in the United States, I doubt the wisdom of the change, which will, however, be conclusively determined by actual experience.

Administrative control over fish and fisheries remains vested in the department of the interior, but there exists no organization for the exercise of such control nor for the investigation of fish and fisheries.

In view of the importance of our pearl fisheries, of the probability that investigation would lead to the discovery of extensive sponge reefs, and of the great importance of marine and fresh-water fish as a source of food supply, it is important that practical work looking to the investigation and development of fisheries should be inaugurated. I believe that this work might result more profitably than do some of the lines of investigation which we are at present pursu-

ing, but thus far it has seemed impracticable to take it up on account of the limited resources of the government.

INVESTIGATION OF UNKNOWN ISLANDS.

On several occasions during the past year when making inspection trips through the provinces I have taken with me representatives from the bureaus of agriculture, forestry, mining, and laboratories, and have made brief preliminary surveys of a number of small islands, the resources of which were quite unknown. While some of the islands visited had no resources of importance, others well repaid the time consumed in their examination.

THE "SALT MINES" OF TARA ISLAND.

Having been informed that there existed on the island of Tara, in the Calamianes group, an extensive salt mine from which a large part of the salt obtained in the Calamianes Islands was derived, I touched there in November, 1904. The only inhabitants were a few wild and apparently entirely naked Tagbanuas who fled at our approach and hid in the thickets where we could not find them.

There is no real "salt mine" on Tara Island, but there is an extensive basin near the sea into which salt water can be led through a short ditch at the time of the highest tides of the year. At the proper time pure sea water is admitted to this basin. Communication with the sea is then cut off, and as there is very little inflow of fresh water the sun's heat suffices to cause complete evaporation. The bottom of the basin is some 15 feet below sea level, and when evaporation is complete there remains a crust of salt several inches thick.

It is obvious that the Tagbanuas who inhabit this island do not molest its feathered denizens, for the swallows were extraordinarily tame and repeatedly alighted upon members of the party while we were resting on the beach.

SIBAY AND SEMERARA.

During the month of December the islands of Sibay and Semerara, south of Mindoro, were visited. Sibay is a limestone island with a large amount of arable land, although the water supply is somewhat limited. It has no true forest. Landing is difficult on account of a coral reef which seems to extend along the entire coast. Sugar or cocoanuts might be raised on this island to advantage, and cogon grass for paper making could be obtained in large quantities.

Upon landing on Semerara we were amazed to find the forests full of grape vines, which not only clambered in profusion over the trees, but grew in the open fields, where they were in some cases so numerous that the natives were obliged to uproot them in order to clear ground for upland rice. Wild grapes of poor quality were known to exist in the island of Negros, but none had been previously reported from the northern part of the archipelago. The natives assured us that the fruit of the variety growing on Semerara was good to eat.

I again stopped at this island in July, 1905. At this time the vines were bearing numerous large bunches of green grapes. In September an agent of the forestry bureau was sent to Semerara and found the grapes ripe. The bunches are of remarkable size. The individual

fruits are smaller than Concord grapes, and the seeds are quite large. A good series of small vines and a quantity of seed were brought back for use in experiments at the Lamao Forest Reserve. It is hoped that valuable results may be obtained by cultivation, by improvement through selection, and by the grafting of imported varieties of grapes onto these native vines.

Another interesting discovery made on Semerara was that nearly half of the trees in the forest were molave. This wonderful hard wood is becoming quite scarce along the coasts of the archipelago, and the discovery of a large supply upon an island so readily accessible as Semerara is of considerable importance.

CAMIGUIN VOLCANO.

During a visit to the island of Camiguin in March, 1905, opportunity was taken to investigate the volcano which suddenly rose from a plain within a short distance of the town of Catarman in 1872, and which had never previously been climbed. In Volume I, Census of the Philippine Islands, the statement is made that this volcano is inactive. Such is not the case. It is one huge stone pile, and sulphur fumes are constantly escaping from numerous solfataras, which are quite generally distributed, but are more numerous on a shoulder just before the summit is reached than in the actual crater of the volcano, which may yet do serious damage to the town at its base.

The assent, which was said to be impracticable, really presented no serious difficulties and was accomplished in four and a half hours.

THE BOARD OF HEALTH FOR THE PHILIPPINE ISLANDS.

On April 27, 1905, Maj. E. C. Carter retired from the position of commissioner of public health, having been ordered to report for duty at Washington by the Secretary of War. Major Carter assumed the duties of this office September 9, 1902. Under his administration the efficiency of the board of health was greatly increased and the sanitary condition of Manila materially improved.

From the outset Major Carter was unfavorably affected by the climate of the Philippine Islands, and, as a result, during his sojourn not only experienced great bodily discomfort much of the time, but suffered from a number of severe attacks of illness. While looking forward with eagerness to relief from detail in the Philippines, he devoted himself to the discharge of his duties with admirable singleness of purpose. Shortly before the end of his third year of service in the islands he was relieved from duty here on account of failing health.

Major Carter had not only the ability and skill of a highly trained medical officer, but a personality which endeared him to all who knew him, and I am sure that those whose pleasure it was to be associated with him felt a distinct sense of personal loss upon his retirement from the Philippine service.

He was succeeded by Dr. Victor G. Heiser, of the United States Marine-Hospital Service, who had made an admirable record as chief quarantine officer of the Philippines.

The report of the board of health for the present year (Appendix A) appears in two parts: Part I, by Doctor Heiser, covers the period from April 1 to August 31, 1905; Part II, by Major Carter, covers the period from October 31, 1904, to March 31, 1905.

REAPPEARANCE OF CHOLERA.

The most noteworthy feature of the health situation during the year was the reappearance of Asiatic cholera. The first known case of this disease at Manilla occurred on August 23. Later investigation, however, showed that it had appeared at Jala Jala, on the Laguna de Bay, prior to August 20; and there is strong reason for believing that a number of cases had occurred at about the same time at Pateros, Pasig, Taguig, and Muntinlupa, which are towns situated upon the upper Pasig River and the Laguna de Bay. Through the neglect of the local authorities these suspicious cases were not reported. There had been no previous cases since April 18, 1904, but it is believed that the new epidemic had its origin in the opening of some old infected well or other source of contagion in one of the lake towns.

During the early days of the outbreak climatic conditions were very favorable to the spread of the disease, the days being hot and the humidity very high. The number of daily cases at Manila increased slowly but steadily until it reached a maximum of 27 on September 3. From that time it steadily decreased until three days passed without any cases. On October 7 there was a slight recrudescence, 7 cases occurring. The number of cases at present writing, October 26, averages slightly less than 1 per day.

METHODS EMPLOYED TO COMBAT CHOLERA.

A very strict marine quarantine was imposed, which has thus far proved entirely effective in preventing the spread of the disease to other islands or by sea to other provinces of Luzon. No land quarantine was attempted, the board of health confining its efforts to direct attack upon the disease by the most thorough disinfection of premises where cases occurred and by the isolation of all cases. In most instances the sick were removed to the San Lazaro cholera hospital, where they were given the benefit of the best possible treatment and care.

There was at the outset much fear of the cholera hospital among Spaniards and Filipinos, and the treatment of a few individuals at their houses was authorized by the commissioner of public health in cases where it seemed that such a course would not be attended with serious danger to others. A competent Filipino physician was in constant attendance at the cholera hospital, in order that those who preferred his services might have the benefit of them, and all patients who desired to do so were allowed to employ private physicians.

ASSISTANCE VOLUNTEERED DURING THE CHOLERA EPIDEMIC.

When the work at the cholera hospital became too heavy for the regular force the chief nurse of the civil hospital, Miss Caroline L. Danford, and Nurses Julia A. Nichols, Sarah E. Spitler, and Hilda E. Altemus were transferred to the cholera hospital at their own request. At the same time the board of health took advantage of the kind offer of Archbishop Harty to spare two sisters of charity from St. Paul's Hospital, who had volunteered their services. They were put on night duty and rendered valuable assistance.

CHOLERA AT BILIBID PRISON.

Cholera promptly appeared in Bilibid Prison, where it was probably introduced by fruits smuggled from the outside. The physician in charge, aided by two physicians placed at his disposal by the board of health and by a third specially employed to meet the emergency, made vigorous efforts to check the disease, but without success.

On September 1 I suggested to the honorable the secretary of commerce and police the desirability of putting the commissioner of public health in absolute control of sanitary matters at Bilibid. An order to this effect was instantly dictated. The commissioner of public health thoroughly inspected the premises on September 2, and directed changes, which were promptly made by Warden Wolfe.

The last case of cholera in Bilibid occurred on September 5.

WORK OF THE CHOLERA HOSPITAL.

Of the 83 cases treated at the cholera hospital to date, 62 have died, 1 is in the hospital at present, and 20 have recovered. Of the 95 cases occurring in the city outside of Bilibid Prison and not taken to the hospital, all have died. This is sufficient evidence of the needlessness of the fear of the hospital which was at first so general. Of the cases not taken to the hospital 3 were almost dead when found. The treatment of 7 outside the hospital was authorized by the commissioner of public health.

The work of the physicians and nurses has been beyond praise, as was the spirit in which they entered upon the discharge of their onerous and disagreeable duties.

EDUCATIONAL CAMPAIGN AGAINST CHOLERA.

Promptly upon the appearance of the disease directions of the simplest sort telling the people how they might protect themselves by the proper use of fire and hot water were prepared, translated into Spanish and into the more important native dialects, and very widely distributed. The department of public instruction caused these instructions to be assigned to school children throughout the archipelago as regular lessons, the children being instructed to communicate them to their parents.

The governor-general transmitted them to provincial and municipal officers, with instructions that they should be put into effect by the passage of the necessary ordinances.

The chief of constabulary caused them to be distributed to constabulary posts throughout the islands, and through the posts to the people in their vicinity.

Archbishop Harty rendered invaluable assistance by causing them to be sent to priests throughout the islands, and directing the latter to aid in securing their observance. He also greatly aided us by visiting in person the cholera hospital and causing the priests in Manila and vicinity to tell the truth about it from their pulpits.

Bishop Aglipay aided in securing the distribution of the circulars and the observance of the rules therein prescribed, and Spanish and Filipino physicians cooperated with the health authorities to a greater extent than ever before.

The results of this campaign of education were promptly felt. In neighboring towns of Bulacan, Pampanga, and Cavite, to which cholera was brought by travelers from Manila, the first cases were so promptly and effectively dealt with by the local authorities that there were no subsequent ones.

This condition was in marked contrast with that which prevailed during the previous epidemic, when it seemed that every case in a provincial town gave rise to others unless employees of the board of health were on hand to deal with it.

COMBATING CHOLERA IN THE PROVINCES.

As soon as the situation at Manila was somewhat relieved all officers of the board of health who could be spared were sent to combat the disease in the towns on the upper Pasig and on the Laguna de Bay. In every instance their work met with signal success, and as the situation at Manila improved and the force available for work in the provinces increased the disease was rapidly stamped out in most of the afflicted towns.

UNUSUAL COMPLICATIONS.

A singular condition, illustrative of the varied obstacles in the way of sanitary work in this country, developed at Taytay, where there arose a "miraculous healer," who soon became known as "the queen of Taytay." This young woman mixed in the body of an old bull cart, which served her as a tank, a concoction of ditch water and vegetable substances, in which she caused persons ill with all sorts of diseases to wash their hands and other portions of their persons. They then drank of the water, while the "queen" pronounced a few magic words. Many of them were allowed to bottle the water and take it away with them, and bottles of it were sent to the sick in distant towns. The afflicted flocked to this woman by the hundred, and among them came a number of cholera patients, so that she was shortly propagating this disease in a most scientific manner. As the local authorities refused to deal with her, either because they feared the consequences or for the reason that they actually believed in her, the Manila health authorities caused her to be arrested and brought to Manila, where she was examined as to her sanity. It appeared, however, that she was perfectly sane. A large delegation from Taytay followed her to Manila and begged for her release, and she was set at liberty after solemnly promising to refrain from the performance of further "miracles" and after being officially warned in the presence of witnesses that she would be promptly prosecuted if she broke her promise. Since that time she has created no further trouble.

ASSISTANCE RENDERED BY THE ARMY.

The military authorities were called upon to establish a guard along the Maraquina River to protect the Manila water supply and promptly complied with the request. They have rendered efficient and valuable service and have at the same time avoided antagonizing the people in the river valley, who are necessarily greatly inconvenienced by the regulations which are indispensable to the protection of

the Manila water supply. Army surgeons have been ordered to render all possible assistance, and several have been detailed for service with the board of health.

SUMMING UP OF THE PRESENT SITUATION.

Of the 220 cases of cholera reported in the city of Manila to date (October 20, 1905), 93 were found dead.

While the situation is not free from danger so long as a single case of cholera exists, it is not too much to say that the campaign of the board of health, which has imposed practically no unusual expenditure on the insular government, has thus far been brilliantly successful. The success attained is due to the exceptional ability and tact displayed by Doctor Heiser in directing the work and to the high degree of efficiency and the fearless devotion to duty of his subordinates, as well as to the hearty cooperation of the physicians of Manila, the Catholic Church, the Independent Philippine Church, and many of Manila's most influential citizens, both foreign and native. As a result, thousands of lives have been saved and great property loss and heavy expense averted, and there is good reason to hope that the disease may ultimately be stamped out and a widespread epidemic, with its ruinous after consequences, avoided.

The heartiest thanks of this department are due, and are hereby extended, to all who have cooperated to this end.

TREATMENT OF LEPROSY BY THE X RAY.

Late in the year of 1902 my attention was attracted by an article which appeared in a popular magazine on the treatment of lupus by the Finsen ray, and it occurred to me that the apparatus there described, or some modification of it, might possibly prove of value in the treatment of leprosy in its early stages. I took the matter up with Maj. E. C. Carter, commissioner of public health, and from him gained additional information as to the results which had been obtained by him in using the X ray for the treatment of certain forms of cancer. While neither of us were at all sanguine as to results, it seemed best to secure an X-ray apparatus and experiment with it upon lepers who might volunteer for treatment. The necessary funds were accordingly made available and the apparatus was ordered.

On March 5, 1903, Dr. H. E. Stafford, the attending physician and surgeon of the civil hospital, offered to place at the disposal of the commissioner of public health the X-ray machine at that institution and to furnish an isolated room in which the treatment could be carried on. The commissioner of public health replied that the offer would be accepted, but seems to have taken no further action in the matter.

The apparatus ordered for the San Lazaro hospitals did not arrive until September 8, 1903, and the treatment of patients was not begun until January, 1904, when it was at last inaugurated by Dr. H. B. Wilkinson, the physician at that time in charge.

While it is the opinion of Doctor Wilkinson, Doctor Heiser, and myself that further work should have been done before the results obtained were published, the fact that some inkling of them leaked

out and was made a basis for untrue and sensational statements in the public press makes it now seem desirable that an authoritative statement should be made as to the methods employed and the results obtained.

The apparatus used was made by W. Watson & Sons, 313 High Holborn, London, and is fitted with a variety of tubes supplied by that firm. A bifocal tube, exhausted for a 10-inch spark, has given the most satisfactory results.

Thirteen cases have been treated during the past year. The following table shows the results in each instance:

No.	Sex	Age	Duration of disease.	Number of treatments	Date of treatment.	Result.
			Years.			
1	Female	15	9	44	Ja . 31, 1904 Jan 29, 1905	Not improved.
2	Male	8	1	13	Apr 23, 1904 Nov 21, 1904	Do.
3	do.	8	5	11	Apr 23, 1904 Nov, 21 1904	Improved.
4	Female	10	3	12	Apr 23, 1904 Nov 21, 1904	Not improved.
5	Male	37	1	14	Apr. 11, 1904 Sept 8, 1904	Cured
6	Female	12	5	40	Sept. 10, 1904 Feb 1, 1905	Improved
7	.....do	14	4	37	Sept. 10, 1904 Jan 23, 1905	Do.
8	Male	13	4	38	Sept. 10, 1904 Jan 23, 1905	Do.
9	Female	12	7	14	Oct 25, 1904 Jan 23, 1905	Do.
10	Male	16	5	12	Oct 27, 1904 Jan 20, 1905	Do.
11	do	36	18	15	Oct. 27, 1905 Jan 17, 1905	Do.
12	.... do	19	2	52	Jan 9, 1905 June 7, 1905	Cured.
13	... do	25	2	14	May 8, 1905 June 7, 1905	Do.

It will be noted that the treatment began at different times with different patients and has been decidedly irregular, Doctor Wilkinson's work having been interrupted by absence on leave in the United States.

As to the completeness of the cure in one instance there is no room for doubt. The man subsequently died from liver trouble, and parts of all important organs of his body were made the subject of searching bacteriological examination by Dr. M. Herzog, pathologist of the bureau of government laboratories. Not a single bacillus of leprosy could be found, although they were present by the million when treatment began. At this time the disease was far advanced and the patient was horribly disfigured, his right ear being some 4 inches long, while the right side of his face was so swollen that the eye was entirely closed. It is greatly to be regretted that photographs were not then taken of him, but the fact is that no one had the slightest hope of recovery or even of material improvement in his case. Contrary to all expectation, patients who have done best under the X-ray treatment have, in many instances, been those who were badly diseased and showed very extensive lesions. Improvement has been most rapid in those where the treatment was carried to the point of slightly burning the superficial tissues, and has taken place not only in the lesions subjected to the direct action of the rays, but in others in remote parts of the body which the rays could not have reached.

The results are such as to strongly suggest the theory that the lepra bacilli are killed in large numbers in the diseased tissue treated, and that through their disintegration toxic substances are formed which are carried by the circulation through the body and kill the living bacilli with which they come in contact.

Systematic experiments on an additional number of lepers are being carried out, and the results will be made public at the proper time. All that can now be said is that with three bad cases out of thirteen under treatment, cure has been complete in one instance and is believed to be complete in the other two, most careful microscopic examination of tissue from the sites of former lesions failing to show the presence of lepra bacilli and the external symptoms of the disease having disappeared. Seven of the other cases show marked improvement. There is, therefore, at least a ray of hope for those afflicted with this horrible disease.

Fuller particulars on this subject will be found in the report of Dr. H. B. Wilkinson, entitled "Some Observations on Leprosy in the Philippine Islands, With an Account of its Treatment with the X ray," which is appended to the report of the commissioner of public health as an exhibit.

A detailed account of other work of the board of health during the past year will be found in the reports of Doctor Heiser and Major Carter. Only a few of its more salient features can be here touched upon.

ESTABLISHMENT OF AN INSANE HOSPITAL.

A good hospital for the insane, in which are accommodated 75 patients, has been established in the main building at San Lazaro.

There is urgent need of additional quarters for the care of the insane, just as there is need of a hospital for the blind, an orphan asylum, a maternity hospital, and other institutions whose object it is to relieve human suffering.

Opportunity for work along these lines is practically unlimited, but unfortunately the funds at the disposal of the insular government are very strictly limited, and it must do, not what it would but what it can.

SMALLPOX.

Smallpox has been eradicated from Cavite Province, where it had prevailed for years.

Some 213,000 persons have been vaccinated in the city of Manila by the board of health and many more by private physicians. There have been but 39 cases of smallpox, with 12 deaths, in the city during the year.

As an evidence of the conditions which prevailed under the Spanish régime, one has only to look at the pockmarks borne by a large percentage of the inhabitants. Of the 39 cases which occurred, nearly all were among new arrivals who had just entered the city overland, and the remainder were among persons who had escaped vaccination.

VACCINATION.

Vaccination in the provinces has been more efficiently performed than ever before, being conducted by men carefully trained at Manila and kept under constant supervision by inspectors of the board of health.

The former commissioner of public health calls attention to the fact that he was never given anything like the force of vaccinators asked for, and that toward the end of the fiscal year he was forced to reduce his force of vaccinators from 100 to 75 in order to keep within his appropriation. To this it may be replied that the practice of greater economy in connection with other lines of work carried on by the board of health would have left available sufficient funds to keep the vaccinating corps at its lawful maximum, and that, while the government has not been able to do all the vaccinating needed to be done, 1,064,192 persons, or more than one-eighth of the entire population, have been vaccinated during the past year.

The greatest difficulty in the way of fully protecting the people of these islands against smallpox by vaccination is not the smallness of the corps of vaccinators, but rather the unfavorable climatic conditions, which render it very difficult to keep vaccine virus for any length of time in the provinces. Unfortunately, this virus has never been successfully dried, and it deteriorates rapidly under the influence of heat. Unquestionably, a considerable amount of inert virus has been used by the board of health.

BUBONIC PLAGUE.

The plague situation steadily improves. This disease is confined to Manila and Cebu, and the total number of cases during the past year is less than one-half that of the preceding year.

PROVINCIAL BOARDS OF HEALTH.

In spite of long-continued efforts to increase their efficiency, provincial boards of health have, with individual exceptions, proved unsatisfactory. An act providing for the abolishing of these boards and the substitution therefor of medical inspectors, operating under the immediate direction and control of the commissioner of public health, has been sent to the Commission, and its enactment will be recommended as soon as the disappearance of cholera brings a return of normal conditions.

LEPER COLONY.

After many vexatious delays, the last of which was occasioned by the fact that a pump with a 100-foot lift was ordered for supplying the colony with water, when the actual lift necessary was 217 feet, the leper colony at Culion has finally been made ready for occupancy, and it is planned to begin sending lepers there during the month of November. Accommodations for some 600 persons are available. It has been deemed wise to start with this limited number and gradually to develop the colony along lines which experience may show to be best.

GENERAL IMPROVEMENT OF SANITARY CONDITIONS AT MANILA.

Important improvement in sanitary conditions at Manila has been made by the filling of the old moat and adjacent low-lying tracts of land with dredgings from the harbor; by the opening of broad, new streets; by the inauguration of the street railway service, which

makes it possible for the poorer people to move out into the country, where they can secure house lots more cheaply, and thus relieve to some extent the congestion in certain districts; by the installation of additional public closets, and by the steady improvement in methods of collecting and disposing of night soil, garbage, and other noxious substances.

The board of health has also inaugurated a campaign against mosquitoes with some success.

BOARD OF DENTAL EXAMINERS.

The board of dental examiners has examined, registered, and admitted to practice 4 graduate dentists and 6 undergraduates in dentistry.

BOARD OF PHARMACEUTICAL EXAMINERS.

The board of pharmaceutical examiners has examined 27 applicants during the year. But 9 candidates have attained the required average and received certificates as pharmacists. During the year the board issued 108 apprentices' certificates, 11 temporary certificates, 1 practicante's certificate, and 1 pharmacist's certificate without examination.

BOARD OF MEDICAL EXAMINERS.

The board of medical examiners, since its organization on January 4, 1902, has registered 121 doctors of medicine, 294 licentiates of medicine, 153 cirujanos ministrantes or practicantes, and 31 midwives.

Classified racially, there have been registered 456 Filipinos, 105 Americans, 27 Spaniards, 6 Japanese, 2 English, 1 German, and 1 Chinese.

The reports of the boards of dental, pharmaceutical, and medical examiners are appended hereto, and marked Appendixes B, C, and D, respectively.

NEED OF A MEDICAL COLLEGE.

A modern medical college is one of the greatest needs of these islands. In attempting to carry on municipal and provincial sanitation the board of health now encounters an insuperable obstacle in the lack of a sufficient number of competent physicians. There is at present but 1 physician to each 18,399 inhabitants. In Manila the ratio of physicians to population is 1 to 977, but in the provinces outside of Manila this ratio is but 1 to 50,445. There is but 1 physician to 432 square miles of territory outside of Manila. In some of the provinces conditions are especially bad. In Bohol there is but 1 physician for 269,223 people; in Ambos Camarines, 1 to 119,702; in Cebu, 1 to each 108,754; in Leyte, 1 to each 129,640; in Pangasinan, 1 to each 132,634; in Samar, 1 to each 133,118; in Surigao, 1 for the entire population of 115,112.

The provinces of Mindoro, Misamis, Nueva Viscaya, and Palawan are without physicians, except when constabulary surgeons or inspectors of the board of health are temporarily stationed there.

By taking advantage of the personnel and facilities at the disposal of the bureau of laboratories, the board of health, and bureau of education a good government medical college can be established at very slight cost. Commissioner Tavera and the undersigned have been appointed a committee to report upon this matter and are prepared to submit to the Commission an act for the establishment of a medical college where Filipinos may be trained to meet what is at present one of the most crying needs of their country.

The report of former commissioner of health, Maj. E. C. Carter (Appendix "A"), contains not only detailed information as to the work of the board of health from September 1, 1904, to March 31, 1905, but a very complete summing up of the health situation in the islands at the latter date and valuable suggestions based on his experience of more than two and one-half years as commissioner of public health. Attached thereto as exhibits will be found statistical tables, the report of the chief health inspector for the Philippine Islands, the report of the sanitary engineer for the Philippine Islands, the report of the physician in charge of the San Lazaro hospitals, the report of the physician in charge of the Sampaloc hospital, some observations on leprosy in the Philippine Islands, with an account of its treatment with the X ray by the physician in charge of the San Lazaro hospitals, and the report of the chief veterinarian.

BUREAU OF QUARANTINE SERVICE.

Quarantine work in the Philippine Islands is performed by the Public Health and Marine-Hospital Service of the United States Treasury Department; but the entire expense of the service is made a charge against the insular treasury.

A condition of affairs which obliges the government of these islands to pay for a service over which it can exercise no direct control is obviously abnormal. The United States Government is greatly interested in preserving the public health in the Philippines for the better protection of its land and marine forces stationed here, and I strongly recommend that steps be taken at an early date to secure payment of the cost of the quarantine service in the Philippines by the Government of the United States.

Under the able direction of Dr. Victor G. Heiser the Service has maintained its usual high degree of efficiency. Although cholera has reappeared in the islands, there is no reason to believe that it was imported. On the contrary, all indications point to its having arisen through a recrudescence of the last epidemic at points along the upper Pasig River and the western shore of the Laguna de Bay, whence it spread to Manila.

The results of the quarantine operations for the year indicate a great improvement in the general health of the islands. The number of vessels found infected upon arrival was only about one-half that of last year.

Owing to the constant presence of quarantinable diseases in neighboring foreign countries, the responsibility which confronts the Service in preventing their introduction is very heavy. There have been "contacts" at the Mariveles Station practically throughout the year.

ASSISTANCE FROM THE ARMY AND NAVY.

The Army and Navy have rendered valuable assistance in carrying out quarantine regulations. At Jolo and Zamboanga the Army permits its medical officers to act as quarantine officers, and at Cavite the admiral commanding the Asiatic Fleet has detailed a medical officer as quarantine officer of that port. The cost of the service is thus materially decreased and its efficiency promoted.

VESSELS BOARDED.

The total number of vessels boarded by quarantine officers was 9,516, or 2,049 less than during the previous year. The actual number of vessels entering Philippine ports was, however, greater than that of last year, many having been exempted from inspection for quarantine purposes, for the reason that they carried army medical officers as a part of their crews, or for other sufficient cause.

VESSELS DISINFECTED.

One hundred and three vessels were disinfected and 18 additional vessels were partially disinfected.

Twenty-six vessels were disinfected because quarantinable diseases were found on board, and the remainder because they came from infected ports, or had no bills of health, or at the request of the board of health on account of their being infected with cattle diseases. The number of infected vessels for the previous year was 41.

The value of a well-equipped quarantine station was illustrated in the case of the U. S. battle ship *Wisconsin*, on which smallpox appeared in February, 1905. The usual methods at the command of a ship's medical officer for stamping out the disease were followed; nevertheless, it continued. The *Wisconsin* was sent to Mariveles Station, the cases were removed, and the suspects segregated. The crew were taken ashore, bathed, and their effects disinfected with steam. The vessel was disinfected and the entire personnel was placed in strict quarantine. No further cases occurred. When it is remembered that the crew of this vessel consisted of 719 men the importance of the results obtained will be readily appreciated.

VESSELS FUMIGATED.

Two hundred and seventy-seven vessels were fumigated for the purpose of killing rats and vermin.

THE INSPECTION OF CARGO.

The sanitary inspection of incoming cargo is perhaps the most difficult duty performed by the quarantine station at Manila. After long and fruitless attempts to enforce regulations which would make safe vegetables and other produce from China, usually eaten raw, it was finally decided to absolutely prohibit the entrance of such produce, although vegetables that must ordinarily be cooked before eating, or which, for commercial reasons, must necessarily be shipped dry, are granted entry, provided they are certified as safe by the quarantine officer stationed at the port of departure.

PLAGUE.

Only one case of plague has been detected on an interisland vessel during the year. Infrequent cases of plague still occur at Manila and Cebu, but the situation steadily improves at both places.

SMALLPOX AND VACCINATION.

More vessels have been found with smallpox on board during the past year than for any other similar period since the quarantine service was established. Eighteen vessels were found to be infected with the disease. The total number of cases observed was 33. Systematic vaccination of interisland crews has continued, with the cooperation of ship owners, and is beginning to show results. During the year, although the number of infected vessels was greater than before, the percentage of cases among the crews was actually less.

The quarantine service vaccinated a grand total of 20,887 persons.

LEPROSY.

Cases of leprosy were detected on three vessels during the year.

OTHER DISEASES.

The following unquarantinable diseases and injuries were observed on vessels:

Dysentery	22	Beri-beri	79
Diphtheria	1	Malarial fever	24
Tuberculosis	7	Wounded in battle (including Russian sailors)	271
Typhoid fever	2		

It will be noted that of the actual diseases encountered beri-beri was by far the most serious. The sailing vessel *Minerva II* arrived in Manila, after a nightmare of a trip from Saigon, with its entire crew disabled from this disease, several months having been consumed on a voyage that should have been completed in eight or nine days.

AID TO OTHER SERVICES.

During the year there were 703 physical examinations of ships' officers, resulting in 70 rejections. Two thousand nine hundred and fifty-one emigrants were examined, of whom 167 were certified for rejection. Vessels were disinfected at the request of the board of health on account of the presence of cattle diseases. Cadets of the nautical school were given physical examinations in order to determine whether they would make fit candidates for physicians in the merchant service. Officers and sailors were physically examined to determine their fitness for positions on coast-guard vessels. Boards were convened for the purpose of examining sick officers of the Coast and Geodetic Survey, and special physical examinations were made at the request of the Philippine civil-service board.

CEBU QUARANTINE STATION.

This well-situated and valuable quarantine station is three-fourths completed. A full account of this station and its equipment will be found in the report of the chief quarantine officer for the year ending August 31, 1905, as will details relative to immigration, the expenditures of the bureau, and the operations of its several stations, together with full statistical information, showing in detail the operations of the service throughout the year. (Appendix E.)

PHILIPPINE CIVIL HOSPITAL.

The work of the officers and employees of the civil hospital has continued to be of the most satisfactory character, and the results obtained have been highly gratifying.

While the difficulties caused by the unsuitable character of the buildings at present occupied continue serious, the situation has been slightly relieved by the removal of the chemical laboratory from the building immediately in the rear of the main hospital to the new laboratory building on Calle Herran. To the building thus vacated were transferred the male attendants, while the building previously occupied by them was converted into a maternity ward, with ward space for 12 patients, 2 private rooms, a room for babies, and a confinement room. The occupants of the former women's ward have thus been relieved from the disturbances caused by confinement cases and by the crying of infants.

NEW HOSPITAL BUILDINGS NEEDED.

The attending physician and surgeon renews his recommendation, now so often repeated, that modern hospital buildings be erected and that the present unsatisfactory building and site be abandoned as soon as possible. The reorganization committee has also made very strong recommendations to the same effect, calling especial attention to the insanitary character of the site of the present hospital, to the enormous cost which would be involved in making conditions satisfactory by filling the neighboring flooded and mosquito-breeding lands, to the necessary increase in the force of nurses and attendants involved by having patients scattered through so many disconnected buildings, and to the fact that the rental now paid by the government is equivalent to the interest on the sum of $200,000 at the rate of interest paid by the government on bonds for public improvements.

I desire to add my own earnest recommendation that the Commission give early consideration to this most important matter. While realizing fully that the calls upon the insular government are many and urgent and that much has already been done to relieve human suffering through the civil hospital, the San Lazaro contagious-diseases hospitals, the civil sanitarium at Baguio, and the leper colony now just completed at Culion, and through the activities of officers of insular and provincial boards of health throughout the islands, I am nevertheless of the opinion that the expenses incured for the establishment and maintenance of hospitals have not been proportionate to the demands of the situation, and that a liberal sum should be expended, if necessary, from the money accruing from the next pub-

lic improvement bond issue, to provide additional modern hospital facilities at Manila.

The Commission has delayed action in this matter in the hope that it might be possible to secure from the Army the grounds and buildings of the First Reserve Hospital, and the honorable Secretary of War now has under advisement the question of turning over these grounds and buildings to the insular government. Should this be done the existing buildings could be repaired and improved at a comparatively small expense. They would furnish accommodations for about 250 patients as against the maximum of 100 which can be accommodated by the present civil hospital, and existing conditions would thus be greatly relieved.

I am, however, not of the opinion that the First Reserve grounds would make a satisfactory permanent hospital site. The present buildings were not constructed for hospital purposes and can not well be made thoroughly satisfactory. There is very little room for expansion to meet future needs in excess of 250 beds, or for the establishment of a training school for native nurses, which is greatly needed—in fact, the Army finds it necessary to quarter its nurses at a considerable distance from the hospital grounds. On the south and east of the grounds are two very busy streets, from which clouds of dust are constantly raised during the dry season by passing vehicles, while the direction of the prevailing winds is such that this dust is driven directly into the hospital buildings.

In my opinion, the Commission should ultimately pursue the policy originally decided upon and establish a modern hospital upon the old exposition grounds and the recently acquired tract of land immediately adjacent thereto. This site would be an ideal one, on account of the presence of shade, of the absence of dust and noise, of the immediate proximity of the building of the bureau of science and of the proposed site of the future medical college, and especially on account of the opportunity for expansion to meet future public needs.

A pavilion hospital should be established on this ground as soon as possible. Plans for a series of buildings sufficient to meet the probable needs for many years to come could readily be decided upon in advance and individual buildings could be erected as necessity might require, so that heavy initial expenditure could be avoided. The proximity of the power plant of the new laboratory building would make steam for disinfection, power for laundry work, and electricity for lighting purposes readily available at small expense.

AMŒBIC DYSENTERY.

Amœbic dysentery continues to be the most serious ailment from which civil officers and employees suffer. Curiously enough, the number of cases treated during the year has been exactly that of the previous year, namely 253. There was, however, but 1 death as compared with 3 for the previous year.

No satisfactory method other than boiling or distillation has yet been found for ridding the city water of amœbæ. Experiments suggested by the attending physician and surgeon for the determination of the amount of acidity necessary to make drinking water safe, with a view to the use of lime juice or similar substances in drinking

water where boiling or distillation are not readily practicable, are in progress at the bureau of laboratories. It has been demonstrated that lettuce and other vegetables can not be made safe by repeated washings in distilled water, but that ordinary vinegar promptly kills all amœbæ with which it comes in contact.

MALARIA.

While the number of malarial cases treated has been small, many of them have been of the pernicious type, patients being frequently brought into the hospital in a comatose condition. Mortality in these cases has been very high.

SUCCESS OF SURGICAL WORK.

The surgical work has been especially successful, 75 cases of appendicitis having been operated upon without a single death, while there have been 27 cases of operation for liver abscess with but 2 deaths. Examination of the appendixes removed has shown the amœbæ of dysentery present in more than half the cases, and there seems little room for doubt that the presence of amœbæ in the vicinity of or in the appendix may give rise to appendicitis, and that the appendix affords a refuge for amœbæ where they are not reached by quinine solution or other enemas and from which they subsequently sally forth to again invade the intestinal tract, thus causing a recurrence of dysentery after an apparent cure.

NUMBER OF PATIENTS.

The total number of patients admitted for treatment during the year was 1,641; 1,157 of these patients were treated by the civil hospital staff and 184 by outside physicians. Among the former class the percentage of deaths was 2.9, or, deducting 9 patients who were admitted in a dying condition, 1.92. The death rate in cases treated by outside physicians was 6.52 per cent.

It will be noted that the total number of patients admitted was 260 less than during the previous year. The percentage of mortality has remained practically unchanged.

CALL FOR MEDICINES IN THE PROVINCES.

There has been a constantly increasing demand on the part of civil employees residing in the provinces for packages of simple remedies. Requests have been complied with where medicines were wanted by employees for their personal use, but where medicines were desired for issue to sick Filipinos requests therefor were turned over to the board of health, in order that medicines might be supplied from the stock available for free distribution to indigent natives.

Full details of the work of the civil hospital may be found in the annual report of the attending physician and surgeon, which is appended hereto (Appendix F).

CIVIL SANITARIUM AT BAGUIO.

The civil sanitarium at Baguio has been made far more accessible than ever before by the completion of the Benguet road. On January 29, 1905, Major Kennon, engineer in charge of the Benguet improvements, drove to Baguio in his carromata. Additional grading was, however, necessary, and the first stage did not go over the road until February 8. From this time on communication was practically uninterrupted throughout the dry season, and after the 1st of April a regular time schedule was established for stages between Dagupan and Baguio. Those who desired to make the trip slowly were able to leave Manila on the noon train, spend the night at Dagupan, take the stage at 6 o'clock the following morning, spend the next night at Twin Peaks, leave there the following day at 7, and arrive at Baguio about 11 a. m., while those who were in a hurry could leave Manila on the early morning train, take a carromata to Twin Peaks the same afternoon, and reach Baguio the following morning, twenty-eight to thirty hours after leaving Manila.

It is believed that during the coming year an increased number of persons will find it convenient to go by horseback from Twin Peaks or Camp Four. Only when traveling in this way or walking can one fully appreciate the magnificent mountain scenery along the last few miles of the road.

IMPROVEMENTS TO BUILDINGS.

Coincident with the opening of easy communication was the completion of a two-story addition to the sanitarium, which practically doubled its capacity. The new rooms were so arranged as to receive a maximum of sunlight and fresh air and offered accommodations far superior to any previously available. An outside kitchen was constructed, and the old kitchen of the main building was converted into a well-lighted dining room, with comfortable seating capacity for 60 persons. A 3,000-gallon water tank was constructed on the top of a 45-foot tower upon the hillside immediately back of the sanitarium and kept filled by a Rider-Erricson hot-air pumping engine. It was connected with sinks and bathrooms throughout the sanitarium, and a hydrant conveniently situated on the hillside supplied water to occupants of government cottages. This water supply is a great convenience and a safeguard against fire, as the head is sufficient to throw water over the sanitarium building.

FOOD PROBLEM SETTLED.

The food problem was solved by the opening up of the road, which made it possible to ship refrigerated beef, butter, and similar supplies from Manila, and by the production of green vegetables in considerable variety and large quantity at the Trinidad agricultural experiment station.

The table and room service at the sanitarium was greatly improved by the employment of a superintendent and Chinese servants.

NUMBER OF GUESTS.

The growing appreciation in which the sanitarium is held is well shown by the number of persons who have availed themselves of its advantages during each fiscal year since it was opened. From the period from February 3 to June 30, 1902, this number was 38; for the fiscal year 1903 it was 130; for the fiscal year 1904 it was 204, and for the fiscal year 1905 it was 667.

EFFECT OF CLIMATE.

The effect of the Baguio climate on convalescent persons continues to be very uniformly good, especially in the case of those suffering from obstinate attacks of amœbic dysentery, which have proved refractory to treatment in the lowlands.

TRANSFER OF EMPLOYEES.

The discretionary power vested in the secretary of the interior relative to the transfer of employees from the civil sanitarium to the civil hospital and to the discharge of employees when no longer needed has been exercised in such a way as to keep only sufficient employees at Baguio to do really necessary work and to give opportunity for recuperation to nurses, attendants, and physicians whose health had failed at Manila. With this latter end in view, Doctor Thomas, the superintendent, was temporarily transferred to the bureau of laboratories and Dr. W. J. Mallory, house surgeon at the civil hospital, was placed in charge of the sanitarium while recovering from amœbic dysentery. Several nurses threatened with complete physical breakdown have been restored to health by detail to Baguio, where they were able, after a short time, to perform full duty.

The superintendent has been continued throughout the year, giving a large part of his time during the slack season to improving the sanitarium grounds. With a water supply available for use during the dry season, it should be practicable to keep the ground attractive in future.

DISEASES AT BAGUIO.

The near approach of the new road, with its swarm of workmen and its attendant swarms of flies, led to the temporary introduction of several diseases which had not previously prevailed at Baguio. There was a slight epidemic of typhoid fever, which was spread by flies, but was promptly controlled, with a total of only 7 cases. There was also a light epidemic of beri-beri among members of the constabulary detachment and prisoners in the provincial jail. The total number of cases was 29, of which 25 were Igorots and 4 Ilocanos. Most of the cases were extremely mild and all recovered.

The very mild character of the disease confirms previous opinion that it is favorably modified by high altitude. Doctor Thomas concludes, as a result of his observations of this epidemic, that beri-beri is an infectious disease, having its origin in the gastrointestinal canal, and that overcrowding and dampness are important predisposing conditions. A generous and varied diet seems to have afforded

no protection against it in this instance, and in many cases the persons attacked were especially muscular and robust.

A general discussion of the character of the diseases treated among the residents at or near Baguio during the past year would throw no light on local conditions, as most of the sick were workmen on the road who had contracted in the lowlands the complaints from which they were suffering.

It is worth while to note in passing that tuberculosis has continued conspicuous by its entire absence among the American and native population at Baguio, not a single case having been observed during the past year.

TEMPERATURE AND RAINFALL.

The highest temperature registered at Baguio during the year was 78.3° F., on April 20, 1905. On the night of the 29th of January there was a hard white frost, which killed the sweet-potato vines of the Igorots and did a large amount of damage at the agricultural experiment station in the Trinidad Valley.

The highest monthly rainfall was 40.52 inches during August, 1905, and on the 29th of that month there was a veritable deluge, 23 inches of rain falling in twenty-one hours. Another day of exceptional rainfall was July 1, 1905, with 16.51 inches. This rain washed out a number of fills on the road and caused the Bued River, which was partially dammed in many places by great quantities of rock blasted into it when the road was being built, to rise so high as to injure several bridges, thus interrupting communication with Baguio by vehicle. The Kias trail has, however, remained constantly open, so that persons able to take the horseback ride from Camp Four to the sanitarium have experienced no difficulty in getting through.

CHANGES IN PERSONNEL.

Dr. J. B. Thomas, who had been in charge of the sanitarium from the date of its establishment in a partially completed native house, resigned in July in order to return to the United States and engage in the private practice of his profession. He was a highly accomplished physician and surgeon, and was always most courteous and considerate in his treatment of patients and guests. During his stay at Baguio he won the confidence and good will of the Igorots of the vicinity, whom he taught to have faith in the white man's remedies, and who brought their sick to him in considerable numbers. He will be greatly missed by all who knew him.

Dr. W. J. Mallory, who had an excellent record as house surgeon at the civil hospital in Manila, was appointed to succeed him. Doctor Mallory had previously recovered from a long and obstinate attack of amœbic dysentery while on detail at Baguio, but had promptly suffered a relapse upon return to Manila. His speedy and complete recovery on being permanently assigned to Baguio affords one more instance of the value of the Benguet climate in the treatment of this disease.

Prior to his departure, Doctor Thomas prepared a report covering the period from September 1, 1904, to June 30, 1905. To this report Doctor Mallory has added statistical tables for the complete year ending September 1, 1905.

Further information relative to the operation of the sanitarium may be had by reference to this report and the accompanying tables (Appendix G).

BUREAU OF FORESTRY.

The work of the bureau of forestry has continued through the year without interruption or unusual incident worthy of special note. As was expected, the cutting in half of the government charges on timber from public lands, effected by Act No. 1148, produced a heavy falling off in revenue, and during the first few months of the fiscal year the receipts from dues on forest products were less than the cost of operating the bureau. Gradually, however, the lower rates led to an increase in the amount of timber cut and of other products gathered.

FALLING OFF IN RECEIPTS.

The great reduction in the government charges brought no corresponding benefit to the public. The price of manufactured lumber in Manila has advanced, if anything, while in the provinces it has remained about stationary. The price of lumber in the log, however, is said to have fallen somewhat in the provinces.

The total receipts for the fiscal year ending June 30, 1905, were ₱343,300.08, as compared with ₱599,480.58 for the previous fiscal year. The excess of receipts over cost of operating the bureau was ₱90,080.51.

GRATUITOUS LICENSES.

A most liberal policy was adopted in the matter of granting gratuitous licenses. The governors of Isabela and Samar were given blanket authority to grant such licenses to needy residents in their provinces, and similar authority was issued to rangers in the provinces of Surigao and Misamis and the subprovince of Catanduanes and to the officials of 9 municipalities that had been visited by storms or fire or were for other reasons poverty stricken.

The amount of timber cut under other gratuitous licenses was 2,827,854 cubic feet, as compared with 1,365,354 cubic feet for the previous year, an increase of nearly 50 per cent.

USE OF FOREST PRODUCTS WITHOUT LICENSE OR CHARGE AUTHORIZED.

By Act No. 1407, passed October 26, 1905, charges have been remitted on all timber other than that of the first group and on other forest products, stone and earth taken from the public forests for use by the individual taking them or for his family in house building, fencing, boat building, or for other private purpose, provided that they are not exported from the province where cut or taken. Dealers in timber or other forest products, stone, and earth are, however, required to pay the usual charges.

This arrangement will doubtless stimulate the construction of better houses by the wealthy, who have heretofore had to pay government charges on timber used for such purpose, and will be a great convenience to the poor, who, although they were entitled to cut timber for house building, etc., under gratuitous license, were put to

inconvenience in making out applications for gratuitous licenses and awaiting their receipt from Manila before they could begin operations.

While there will be some further falling off in the revenues derived from forest products as a result of this change, it is believed that the gain in general prosperity and contentment will be more than sufficient to compensate the government for this loss. In any event, some such arrangement was made very necessary in many provinces by the terrible destruction caused by the typhoon of September 26.

MANIFESTING OF FOREST PRODUCTS TRANSFERRED TO BUREAU OF INTERNAL REVENUE.

Act No. 1407 further provides that the manifesting of forest products, as well as the collecting of dues thereon, shall be performed by officers of the bureau of internal revenue. The forestry bureau, freed of this onerous duty, will now be able to devote itself to the scientific study of the forests and to the supervision of cutting operations, and its usefulness should be greatly increased by the change.

FORESTRY EXHIBIT AT ST. LOUIS.

The chief of the bureau, who was sent to the Louisiana Purchase Exposition on the 15th of August, 1904, not only aided in arranging the forestry exhibit there, but served on the committee for selecting articles which were to be sent back to these islands, and did not himself return until the 2d of March, 1905.

The exhibit of the bureau of forestry at St. Louis attracted wide attention, elicited much favorable comment, and aroused great interest in the forest resources of these islands, as has been evidenced by numerous letters of inquiry received here.

FOREST MAPS.

A provisional forest map of each province of the islands has been prepared. Officers and employees of the bureau are furnished with copies of the maps of their respective provinces and make such additions and corrections as are practicable, so that the maps constantly become more complete and reliable.

TIMBER TESTS.

The timber-testing laboratory has been transferred to Bilibid prison, where prison labor can be employed in connection with it. An important series of tests on some of the more valuable structural woods has continued throughout the year.

Detailed information as to the character and results of these tests will be found in the annual report of the chief of the forestry bureau (Appendix H). These tests are especially important for the reason that they attract attention to excellent varieties of timber which, from the fact that they are unknown in the markets, either can not be sold at all or command prices far below their actual value.

ADDITIONAL INFORMATION.

For further information relative to the sawmills of Manila, the operations of the division of forest management, licenses granted during the fiscal year 1904–5, damage to the public forests caused by clearings and by fire, applications for certification as to the character of public lands, operations at the Lamao Forest Reserve, and for detailed statistics as to the amount and character of forest products taken during the past year, the charges collected upon them, and the provinces from which they were derived; for a list of the more important Philippine woods received in the Manila market during the five preceding years, a statement of government charges collected on forest products during the fiscal year 1904–5 by months, the sources of revenue by products during the same period, a comparative statement of government charges collected on forest products and of the expenditures of the bureau of forestry for the past five years, importation of timber and lumber into the islands, and for newspaper quotations on the value of native timbers in the Manila market, reference is made to the annual report of the chief of the forestry bureau for the year ending September 30, 1905. (Appendix H.)

MINING INDUSTRY AND WORK OF THE MINING BUREAU.

There has been as much development in the mining industry during the past year as was to be expected under the harsh and needless restrictions imposed by section 33 of the act of Congress passed July 1, 1902.

In previous reports I have repeatedly called attention to the disastrous effect of this legislation upon the mining industry, and now deem it my duty to again—and most strongly—recommend that the Commission urgently request from Congress the repeal of this obnoxious section, which limits the number of claims which a person or corporation may hold upon a given vein or lode to one. As far back as 1849, President Fillmore, in his first message to Congress, recommended that the public mineral lands "be divided into small parcels and sold, under such restrictions as to quantity and time as will insure the best price and guard most effectively against combinations of capitalists to obtain monopolies." This recommendation was followed by the acts of Congress of July 26, 1866, and of July 9, 1870, which were in turn superseded by the act of May 10, 1872, which has been incorporated within the Revised Statutes and forms the present Federal mining legislation of the United States.

Only in the act of July 26, 1866, is there found any provision limiting the number of claims that any one person, corporation, or association may hold upon any given vein or lode, and this provision was subsequently repealed by the act of May 10, 1872. I know of no such restriction in the mining legislation of any country, and its workings may therefore be said to have been observed in the Philippines alone. It is the universal opinion of prospectors, mine owners, and officials of the mining bureau and the Commission that this provision has rendered practically impossible the development of gold and copper mines in these islands.

The prospector who has found a considerable body of low-grade ore is prevented from staking and recording claims enough to give him

control of a sufficient oré body to make it possible to interest capital in installing the expensive machinery necessary for the working of the deposit upon a practical basis, and can not escape the difficulty by purchasing additional claims from others.

The Filipino people are clamoring for the establishment of agricultural banks, for the reason that they can not obtain sufficient capital to cultivate their farms. There is not a mine in the proper sense of the word in the Philippine Islands to-day, which is sufficient proof that capital for the promotion of mining enterprises is not available here.

But capital is conservative and will not come until development work upon claims has been done, or until investigations by competent experts justify investment. Experts must be brought from the United States or from Europe. Their services cost far more here than they would at home. It is obvious that only under the most exceptional circumstances can a man afford to bring an expert from America to examine a single claim covering 1,000 by 1,000 feet.

The prospector and the claim holder, be they Filipinos or Americans, are hopelessly handicapped by this section.

In my opinion, it is very desirable that Congress should authorize the Philippine Commission or its successors to make regulations governing the number of mining claims which any person, corporation, or association may locate or hold on the same vein or lode, and the location, manner of recording, and amount of work necessary to hold possession of a mining claim.

But if Congress is unwilling to confer such authority on the Commission, then there should be enacted provisions on this subject similar to those found in section 3829 of the State Statutes of Oregon, which read as follows:

SEC. 3829. Any person may hold one claim by location, as hereinafter provided, upon each lead or vein, and as many by purchase as the local laws of the miners in the district where such claims are located may allow; and the discoverer of any new lead or vein not previously located upon shall be allowed one additional claim for the discovery thereof. Nothing in this section shall be so construed as to allow any person not the discoverer to locate more than one claim upon any one lead or vein.

In view of the fact that there are no "miners' districts" in the Philippine Islands and that the miners do not have local laws, the number of claims which a person may hold by purchase on one vein or lode should be left to the determination of the Commission.

Added to the adverse conditions which result from the peculiar geological formations of this land of volcanoes and earthquakes, from tropical climate, deep soil, and extraordinarily luxuriant vegetation, the hardy prospectors and miners, be they Americans or Filipinos, who have faced and overcome these difficulties find themselves confronted by an insuperable obstacle in this restriction, which serves only to throttle an industry that if properly developed would give employment to thousands of Filipinos and would bring large sums of money into this poverty-stricken country. In the name of all that is just and reasonable, I urge that every effort be made to secure for the mineral industry of these islands the same privileges and opportunities which have resulted in such wonderful development in the United States.

There is a further provision in section 56 of the act of Congress which is deemed to be hostile to the early development of coal lands in these islands. It should be stated that when literally construed this provision is open to no objection, for the reason that section 58 refers to saline lands alone. It is, however, only by taking advantage of an apparent typographical error in section 56 that it can be construed to refer to the saline lands of section 58 and not to the coal lands of section 53, which section corresponds to section 2348 of the Revised Statutes of the United States. The interpretation upon which the following recommendation is based is that accepted as the intent of the law as framed, which is in terms the direct adaptation to the Philippines of a Federal provision now in force concerning coal lands in the United States (Rev. Stat., 2350), and is harmful in its operation here in view of the fact that, under Philippine conditions, a period of one year and sixty days is too limited a time within which to enter upon a coal claim, record it, sufficiently develop it to demonstrate its value, and pay for it in full.

Attention has previously been called to the fact that geological formations have been greatly disturbed in these islands by volcanic and seismic action. Careful investigation with the diamond drill should therefore be made before the purchase of a claim would be justified. Necessary capital for development must, in most cases, be obtained from the United States. All of these things take time. The payment for lode claims may be made at the end of a period of five years, or when assessment work to the value of $500 has been done, or when the locator desires to obtain a patent therefor by purchase at a fixed rate of $5 per acre. The locator of a lode is thus given sufficient time within which to investigate the value of his claim, but the locator of a coal-land claim must satisfy himself as to its value within one year and sixty days after occupation, and must pay the prescribed price in full. This involves the expenditure of such large sums for development, surveys, and the acquisition of title within a short period that, under existing conditions, it is practically prohibitive. There would seem to be no good reason why a claimant for coal lands should not be given sufficient time to investigate the actual value of his claim before deciding whether he desires to purchase, and it is recommended that the period for development and payment be extended to three years.

The coal resources of the Philippines are believed to be extensive, and the economic importance of a large home supply of steaming coal is self-evident. If the coal-mining industry can be encouraged by the granting of a sufficient time within which to develop claims before payment must be made, it should become important in the near future.

Some provision would seem to be necessary relative to the performance of assessment work upon coal-land claims, and it is suggested that for each claim labor to the value of not less than $50 should be required to be performed, or improvements to the value of not less than $50 should be required to be made annually.

The Philippine miners have frequently requested specific authority, such as is granted in Federal law in the United States, to group assessment work for several claims in order that annual labor may be performed upon one of a group for the development of the whole. This would seem to be a reasonable request.

As dredging operations of considerable magnitude are already under way in Masbate and are likely soon to begin in other provinces, some provision covering the subject of dredging in shoal waters between low and mean high tide and in fresh-water streams would seem to be necessary. It is believed that such operations should be permitted under licenses granted by the governor-general, provided that prior vested rights are protected and that navigation is not obstructed.

Should the Commission approve of these suggestions it might recommend to Congress the following amendments to the act of Congress of July 1, 1902:

First. Strike out section 33 of said act and insert in the first paragraph of section 36, after the word "governing," the words "the number of mining claims which any person, corporation, or association may locate on the same vein or lode," so that the first paragraph of said section 36 shall read as follows:

SEC. 36. The Philippine Commission or its successors may make regulations, not in conflict with the provisions of this act, governing the number of mining claims which any person, corporation, or association may locate on the same vein or lode, the location, manner of recording, and amount of work necessary to hold possession of a mining claim subject to the following requirements.

As an alternative amendment the following is suggested:

Strike out section 33 and insert in lieu thereof the following section:

SEC. 33. That no person, corporation, or association shall be entitled to hold more than one claim by location, as hereinafter provided, on the same vein or lode, nor more claims by purchase than may be prescribed by general act of the Philippine Commission: *Provided*, That the discoverer of any new vein or lode not previously located upon shall be allowed one additional claim for the discovery thereof.

Second. Further amend section 36 by inserting before the word "Provided" in the second paragraph thereof the following proviso:

Provided, That where a group of two or more contiguous lode, coal, or placer mining claims are held in common the usual labor may be performed upon any one of them for the development of the group.

Third. Insert in lieu of section 33 (stricken out) the following section:

SEC. 33. That, subject only to such limitations and regulations as may be provided for by the Philippine Commission or their successors to exempt navigation from artificial obstructions or to protect prior vested rights, all navigable waters and all shoal waters between low and mean high tide on shores, bays, and inlets of the Philippine Islands shall be subject to exploration and mining for gold and other precious metals by citizens of the United States or of the Philippine Islands: *Provided*, That such exploration and mining shall be by virtue of licenses granted by the governor-general of said islands: *And provided further*, That no exclusive licenses for this purpose shall be granted.

Fourth. Strike out of the fourth clause of section 56 the word "fifty-eight" and insert in lieu thereof the word "fifty-three;" insert after the words "filed upon," in said clause, the following words, "and show that for each claim not less than fifty dollars' worth of labor has been performed or improvements made annually," and strike out of said clause the words "one year," and insert in lieu thereof the words "three years;" so that said section shall read as follows:

SEC. 56. That the three preceding sections shall be held to authorize only one entry by the same person or association of persons, and no association of persons, any member of which shall have taken the benefit of such sections, either as an individual or as a member of any other association, shall enter or hold any other lands under the provisions thereof; and no member of any association which shall have taken the benefit of such section shall enter or hold any other lands under their provisions; and all persons claiming under section fifty-three shall be required to prove their respective rights and pay for the lands filed upon, and show that for each claim not less than fifty dollars' worth of labor has been performed or improvements made annually within three years from the time prescribed for filing their respective claims; and upon failure to file the proper notice or to pay for the land within the required period the same shall be subject to entry by any other qualified applicant.

The mining bureau has kept in close touch with miners throughout the islands during the past year and has given them valuable advice and assistance. One of the employees of the bureau has been temporarily detailed with the bureau of public lands in order to expedite the survey of mining claims. A large amount of field work has been done, and important reports based thereon are just going to press.

The assaying and analytical work performed by the bureau of government laboratories for the mining bureau has at times been greatly delayed, and as a result the operations of the latter bureau have been considerably hampered. This delay has been due to the fact that when the mineral analyst of the bureau of government laboratories left the service, November 1, 1904, the Commission, as a measure of economy, abolished his position. It was hoped that the work might be so divided among other employees that it would not seriously suffer, but the amount of routine work required during the year was so great that this proved to be impossible.

In arranging for the employees of the new bureau of science, made up of the former bureau of laboratories and the former mining bureau, it is hoped that this difficulty can be satisfactorily met.

PHILIPPINE MINERAL RESOURCES IN 1905.

If the modifications in existing legislation above suggested can be secured the outlook for a profitable mineral industry in these islands will be very hopeful.

So full an account has been given by the chief of the mining bureau in his annual report for the year ending August 31, 1905 (Appendix I), of the mineral discoveries of the past year, the introduction of milling and dredging machinery, the cost of mining operations and the availability of mining labor, that I will not attempt to summarize the facts, but will refer those interested to this report and its exhibits, which contain not only the information above mentioned, but full details of the important field work performed by the bureau during the period covered by the report.

BUREAU OF GOVERNMENT LABORATORIES.

During the past year there were transferred to the bureau of government laboratories from the ethnological survey one American and two Filipino collectors of natural-history specimens. By Act

No. 1407 of the Philippine Commission the mining bureau has also been transferred to it. As much of the work of the collectors of natural-history specimens and of the mining bureau is not laboratory work in the proper sense of the word, the name "bureau of government laboratories" has become inappropriate and has accordingly been changed to "bureau of science."

NEW BUILDINGS.

The bureau of laboratories occupied its new buildings in the month of September, 1904, although they were not entirely completed at that time. The power plant was operated for the first time at the formal opening of the main building on February 28, 1905. The machinery has now been in operation for more than seven months and has given entire satisfaction.

As great misapprehension has existed and many false statements have been published relative to the cost of the buildings and equipment, the actual figures are here given.

The total cost of the main building and power house, mechanical equipment, desks, hoods, fixtures, stables, and small animal houses, and of grading and filling the grounds and constructing driveways has been $201,508.99. In addition, $36,000 have been expended for books, and $26,000 for apparatus, making the total cost to date of buildings, mechanical equipment, library, scientific apparatus, and of improvement of the grounds, $263,508.99. Further comment on the statement that we have a $3,000,000 laboratory would therefore seem superfluous.

WORK OF THE SUPERINTENDENT.

The superintendent of government laboratories was absent on leave in the United States from October, 1904, to June, 1905, and Dr. Richard P. Strong, as acting superintendent, discharged his duties during his absence in a highly satisfactory manner.

The superintendent while in the United States made efforts to secure fellowships for the support of investigators who desired to avail themselves of the admirable opportunities now offered for carrying on scientific work in the laboratories at Manila, and there is little doubt that as a result of his efforts one such fellowship in biological work will be established during the present year.

PROBABLE ESTABLISHMENT OF A MARINE BIOLOGICAL LABORATORY.

Under the original plan of organization of the departments of the insular government there was to have been in the department of the interior a bureau of fish and fisheries. No such bureau has ever been established for the reason that at the outset preference was given to other work deemed at the time to be more important, and later the financial condition of the government became such as to prohibit the incurring of the necessary expense. There is, however, great need of work along the lines which such a bureau would naturally take up.

These islands have a coast line longer than that of the United States and the vast majority of the towns are on or near the sea, which af-

fords a varied and abundant supply of valuable food fishes. Some of the fresh-water streams and lakes contain fishes in abundance, but many of them have been "fished out," and should be restocked and afforded reasonable protection in order that the fish might reach decent size. In the Laguna de Bay, close to Manila, enormous quantities of fry are caught and sent to the markets each year. The more intelligent Filipinos strongly urge that the practice of catching very small fish in this lake and in other fresh-water lakes and streams in the archipelago should be stopped.

There is no reasonable doubt that the Formosan salmon and the rainbow trout would flourish in the cold streams in the high mountain regions of northern Luzon, furnishing a valuable source of food supply to the inhabitants.

There are practically no extensive seining operations carried on in the islands at the present time, and the enormous supply of deep-sea fishes is hardly drawn upon at all. The Philippines should not only produce a large supply of fish for their own inhabitants, but should export fish in large quantities to supply the great demand in the Chinese and Japanese markets.

Our pearl fisheries are at the present time quite important, and investigation would doubtless reveal the presence of extensive pearl-oyster beds in the shallow waters west of Palawan and at other points in the southern and central portions of the archipelago. The subject of artificially fertilizing, rearing, and planting pearl oysters might richly repay careful investigation.

Apart from pearl oysters, various other marine mollusks produce shell valuable for button making or for other purposes.

Sponges of excellent quality are known to exist and a systematic search for sponge reefs would doubtless be well repaid.

Apart from these purely material considerations it should be stated that there is in the southern waters of this archipelago a wealth of vertebrate and invertebrate marine life not exceeded in any quarter of the globe, and the opportunity offered for the identification of marine organisms and for the study of their embryology and their life history can nowhere be excelled. A business of considerable importance might readily be established in supplying the museums and laboratories of Europe and America with specimens for exhibition and study. It is therefore with great pleasure that I report the possibility of the establishment and maintenance in these islands of a marine biological laboratory supported by funds from private sources.

The establishment of such a laboratory would presuppose the erection at Manila of a suitable building connected with which would be a marine aquarium to which the public would be admitted for a small fee. Such an aquarium should prove a source of considerable income. There should also be a scow or flatboat for migratory service, furnished with a dwelling cabin containing laboratory equipment and with pumps and aquaria. Such a floating laboratory could be towed from place to place and anchored in any quiet and well-protected waters.

The purchase of a considerable number of books not at present available in our general scientific library would be necessary.

The superintendent of government laboratories has given quite a large amount of time to the preparation of detailed estimates of the

cost of establishing, equipping, and operating such a marine laboratory. Some delay has been experienced in getting necessary figures, but the estimates are now practically completed and will be submitted to those interested in the near future. Should the final negotiations result successfully, I shall recommend to the Commission that in return for the great benefits which this government and the people of the islands would derive from such an institution it furnish ground for the site of the laboratory building in the vicinity of the present building of the bureau of laboratories, supply it with power from the laboratory power plant, and extend to officers and employees the privileges in the matter of traveling on Government vessels which are accorded to employees of the insular government.

WORK OF THE BUREAU OF LABORATORIES.

The routine work of the bureau of laboratories has continued without serious interruption throughout the year. The number of employees is at present so limited that the energies of the entire force are often taxed in keeping up with the routine work required by other bureaus of the insular government and by the general public. A limited amount of time for the research work planned by the bureau is gained when there is a temporary falling off in the routine work. Such investigations must, however, be again suspended when the routine work increases. This is by no means an ideal condition of affairs, and when the financial condition of the government improves a sufficient increase in the present force should be authorized to make possible the continued carrying on of a reasonable amount of original investigation of a practical sort by competent men.

The officers and employees of the bureau have been able to work in their new quarters to vastly better advantage than was previously possible, and the results obtained have been correspondingly good. The improvement in the health of the force has been very noticeable and is doubtless directly due to the admirable sanitary condition of the new buildings.

ESTABLISHMENT OF A GENERAL SCIENTIFIC LIBRARY.

While the original library of the bureau of laboratories contains by far the most important collection of scientific books belonging to the insular government, the forestry bureau, the mining bureau, the bureau of agriculture, the weather bureau, the civil hospital, and the board of health each had libraries of their own, and each subscribed for scientific publications. Efforts were made by me in checking up requisitions to prevent the duplication of expensive books of reference, but a considerable amount of duplication occurred, and sets of valuable periodicals scattered among these different bureaus were, in not a few instances, found to be incomplete when the time came for binding them. There was no one place in Manila where one could go and ascertain what scientific books were available and where they could be found. I therefore deemed it wise and necessary to direct that all scientific books and periodicals of the several bureaus of this department should be transferred to the library of the bureau of laboratories, there to be catalogued and shelved, provided that books required by the officers or employees of any bureau for frequent ref-

erence might be withdrawn by the chief of such bureau and by him placed where they could be most readily referred to by those who needed to use them. The library thus formed is known as the general scientific library.

Current numbers of periodicals are kept at the offices of the several bureaus especially interested in them, but back numbers are sent to the general scientific library for filing until the sets are completed, when they are bound.

Six thousand seven hundred and ninety-nine volumes were transferred under this arrangement, which has worked very satisfactorily. All requests for new books needed by each bureau go through the superintendent of government laboratories, and duplication is thus rendered impossible, while the numerous separate appropriations for books and periodicals for the bureaus of this department will hereafter be combined into one. For the present, no additional sum will be requested for books for the general scientific library, for the reason that there still remains to be paid the last of the semiannual installments of the amount agreed upon for the purchase of books for the bureau of laboratories, namely, $7,715.11 United States currency. Half of this amount will be requested during the present year; the remainder will be requested during the coming year; and when this final installment has been made available and has been expended, a statement of the amounts heretofore appropriated for books, but not expended, owing to lapses at the ends of fiscal years, will be presented to the Commission, and a request made that these sums which have been covered into the treasury be made available in order that the full amount agreed upon for the purchase of books may be expended for that purpose.

JOURNAL TO BE PUBLISHED.

Heretofore the publications of the bureau of laboratories have been distributed gratis. Numerous requests to purchase them have been received, and authority for their sale at prices to be fixed by the superintendent of government laboratories, with the approval of the Secretary of the Interior, has recently been given by the Commission.

Beginning with the 1st of January the publications of the bureau will be issued in the form of a journal. This will reduce the cost of publication and should very materially reduce the amount annually expended for subscriptions to scientific journals, many of which can be secured as exchanges. It will also bring in considerable sums from subscriptions, which will be paid by many persons who have heretofore requested and obtained the publications of the bureau without charge.

SCIENTIFIC GUESTS.

Doctors Brinckerhoff and Tyzzer, of the Harvard Medical School, to whom the courtesies of the laboratory were extended, have returned to the United States after having completed the work which they came here to undertake. During their sojourn they on various occasions rendered valuable services, for which no pecuniary compensation was made.

Doctor Councilman, of the Harvard Medical School, has requested laboratory privileges for another investigator from that institution, and they have been extended to him.

Several noted German investigators have expressed the desire to avail themselves in the near future of the opportunities which we can now offer for the study of tropical diseases.

Much of the most important work performed by the bureau of laboratories is of so technical a nature as to make a detailed discussion of it out of place in a report of this sort, but full details will be found in the report of the superintendent for the year ending August 31, 1905 (Appendix J), and in the reports of the director of the biological laboratory, the director of the chemical laboratory, and the director of the serum laboratory, which are appended thereto as exhibits.

NATURAL-HISTORY COLLECTIONS.

The collectors of natural-history specimens have worked under my immediate personal direction. During the year they have been sent to the islands of Calayan and Banton, which had never previously been visited by zoological collectors, and have also worked in Mindoro, Tayabas, Romblon, and Sibuyan. While their attention has been given primarily to birds and mammals, they have also gathered insects, reptiles, mollusks, and obtanical specimens in considerable numbers.

Probably no men in the service are so poorly paid in proportion to the services which they render. Mr. McGregor, who is an admirable collector and a skilled ornithologist, receives $1,400 per year, while his Filipino assistants, both of whom are well trained and very capable, receive $600 and $300, respectively. These three young men make no requests for travel allowances, except the sums actually expended by them for steamboat fare and for carriers, while most employees engaged in similar work receive a regular travel allowance or per diem for the entire time of their absence from Manila. Thanks to their capability, energy, and love of their work, the collectors have brought in much very valuable material, which will make possible the establishment of an excellent museum whenever sufficient space can be made available.

The bird collection already numbers some 6,000 specimens and contains representatives of more than half of the species which inhabit these islands, including a number of species not represented in any other collection in the world. Authority has now been secured for the selling of duplicate bird skins. A provisional order for skins to the value of $1,000 has already been received, and it is not improbable that during the coming year the entire expense of maintaining this department of the work will be paid by the sale of material.

WORK OF THE BIOLOGICAL LABORATORY.

In addition to the regular routine work, the officers and employees of the biological laboratory have been able to complete and publish results of researches relative to the causes and methods of treatment of certain tropical diseases which have attracted attention and favorable comment in scientific circles throughout the world.

Dr. Richard P. Strong, director of the biological laboratory, has perfected a serum for protective inoculation against Asiatic cholera which gives a very high blood immunity and which will, it is believed, afford protection against this disease. Many physicians of Manila

and more than 1,000 prisoners in Bilibid have been inoculated with it. It produces no local reaction, and the temporary constitutional disturbance resulting from its use is of insignificant importance. Fortunately for the inmates, but unfortunately for science, cholera was stamped out in Bilibid Prison just at the time the inoculations were made, so that the question as to whether those inoculated would enjoy immunity while many of those not inoculated would be attacked by the disease remains undetermined.

Doctor Strong, most of whose research work is connected with the problem of securing immunity from contagious and infectious diseases, is now engaged in investigations looking toward the improvement of antiplague serum.

WORK OF THE CHEMICAL LABORATORY.

The chemical laboratory has been at times badly overcrowded by routine work, but has nevertheless been able to carry on important investigations relative to gums, resins, and essential oils, and to paper-making materials. The results of the latter work have greatly interested a number of business men who have visited the islands, owing to the growing scarcity of good paper-making materials in the United States. It has been conclusively demonstrated that paper of admirable quality can be made from the cogon grass, which infests millions of acres of land in these islands and which has hertofore been regarded as an unmitigated nuisance; from cañabojo, a variety of bamboo heretofore considered practically worthless, which grows wild over large areas in Palawan, the Calamianes Islands, and elsewhere; from abaca waste; from maguey waste, and from the leaf stems of the burri palm.

The establishment of an important paper-pulp manufacturing industry should result from these investigations.

BOTANICAL WORK.

The botanists have been busily occupied in completing the classification and mounting of the plants in the herbarium, which is now very extensive and which has been greatly augmented during the past year by the collection of new material and by exchanges with many scientific institutions in Europe and America; in identifying tree species and carrying on forest investigations at the request of the bureau of forestry; in investigating plants of supposed economic value for the bureau of agriculture; in identifying plants producing valuable gums, resins, oils, or alkaloids for the bureau of laboratories, and in supplying collections of named plants for use in the public schools at the request of the bureau of education.

ENTOMOLOGICAL WORK.

The entomologists, in addition to the collection, preservation, and identification of a large amount of valuable material, have found time for the study of various insect pests and have secured silkworms from Japan and successfully reared them. One of the entomologists was recently sent by my direction to Cavite Province,

where a newly established silkworm industry was threatened with ruin through the calling away of the only available man capable of caring properly for the worms. While mulberry trees may be successfully grown here, the entomologists are attempting to find some native tree the leaves of which will afford a suitable food for silkworms.

WORK OF THE SERUM LABORATORY.

The work of the serum laboratory has been exceptionally efficient and satisfactory. Vaccine virus and antirinderpest serum have been made in large quantity and at small cost. There have also been made 50,000 units of plague prophylactic, 960 c. c. of antiplague serum, 180 c. c. of cholera vaccine, and 1,296 doses of mallein. Diphtheria antitoxin and antithyroidin are available. The latter substance was made on an emergency order, and the life of a bureau chief was saved through its use. Antitetanus serum will be available within a few months.

At the lowest American wholesale prices the value of the vaccine furnished the government by this laboratory would be ₱436,072, a sum greatly in excess of the total cost of maintaining the bureau of government laboratories for the year, while the value of the antirinderpest serum, at ₱15 per bottle of 300 c. c., the lowest price known outside of these islands, would be ₱60,343.

CHARGES AUTHORIZED FOR SUPPLIES FURNISHED AND WORK DONE.

Heretofore the bureau of government laboratories has been required to perform work and furnish supplies to other bureaus of the insular government free of charge, while it has been obliged to pay many other bureaus for services rendered. It has been allowed to charge the city of Manila, provincial and municipal governments, and the general public for services rendered or supplies furnished, and has furthermore been required to keep, for statistical purposes, a strict account of the value of the services rendered and supplies furnished to the bureaus and offices of the insular government, as well as to provincial and municipal governments and to the public. The following table shows in summary form the bureaus and offices for which work was done or to which supplies were furnished without charge, and the value of such work and supplies in each case; also the receipts from provincial and municipal governments and from the general public for paid work:

Statement of the value of work performed free of charge for the fiscal year 1905.

Board of health:	
Miscellaneous	₱56,071.12
Serums and vaccines	141,596.12
Civil hospital	14,600.33
Bureau of internal revenue	5,371.92
Customs-house	4,261.50
St. Luke's Dispensary	93.00
Mining bureau	578.00
Bureau of engineering	1,420.00
Insular purchasing agent	1,814.00
Public Health and Marine-Hospital Service	856.00
Bureau of agriculture	1,582.40

Bureau of education	₱303.60
Forestry bureau	361.70
Bilibid Prison	5,577.00
Philippines Constabulary	240.00
Ethnological survey	494.80
Treasurer of the Philippine Islands	55.00
Secretary of the interior	686.64
Bureau of coast guard and transportation	469.00
Bureau of architecture	114.00
Civil sanitarium	78.00
Indigents	80.00
Philippine weather bureau	31.88
Bureau of public printing	130.00
Coast and geodetic survey	282.82
Secretary of public instruction	50.00
Civil-service board	3.00
Secretary of commerce and police	10.00
Insular cold storage and ice plant	30.00
Total	237,241.83

These figures are based on a charge of 3 centavos per unit for vaccine virus. This is just half of the Japanese wholesale price, believed to be the lowest price charged anywhere outside of the Philippine Islands. Many of the other charges made are proportionately low.

Act No. 1407 authorizes the bureau of government laboratories to collect from other bureaus of the insular government and from provincial and municipal governments the actual cost of supplies furnished and to sell its publications, natural history specimens, vaccine virus, sera, prophylactics, and supplies not obtainable in the markets of Manila to the general public at prices to be fixed by the superintendent of government laboratories and approved by the secretary of the interior. Analyses and examinations may also be made for the public and for provincial and municipal governments and charged for at prices fixed in a similar manner. The actual income of the bureau will therefore be materially increased during the present year.

For full details relative to the work of this bureau reference is made to the report of the superintendent of government laboratories for the year ending August 31, 1905 (Appendix J), and to the reports of the librarian, the director of the biological laboratory, the director of the chemical laboratory, and the director of the serum laboratory, appended thereto as exhibits.

BUREAU OF PUBLIC LANDS.

At the time of my last annual report forms had been prepared for the making of applications for land under the first four chapters of the public-land act, relating, respectively, to homesteads, sales, leases, and free patents to native settlers. A circular relative to homesteads and a circular relative to the leasing of public lands have since been prepared and printed in both English and Spanish. Copies of the printed forms and circulars and of the public-land act have been given to all persons who applied for them.

NUMBER OF HOMESTEAD APPLICATIONS.

Since the date of the last annual report but 270 homestead applications have been received, of which 3 were rejected, 4 relinquished or withdrawn, 22 were allowed, and 241 were not in proper form.

Some of the latter are waiting for a certification from the forestry bureau as to whether the land applied for is more valuable for forest than for agricultural uses; on some the entrance fee of 10 pesos is still due; and others have been returned to applicants for correction. The greater part of these applications were received during the last six months.

There have been only 188 applications for free patents by native settlers. Of these, 40 were in proper form, 12 were rejected, and 136 are still incomplete.

APPLICATIONS TO LEASE PUBLIC LANDS.

An application to lease 70 hectares of land, which was received in August, 1904, was canceled at the applicant's request in October, 1904, and no other application to be allowed to lease has been received.

APPLICATIONS TO PURCHASE PUBLIC LANDS.

Thirty-six persons and two unincorporated companies, both American, have applied to purchase agricultural public lands. One of the latter applications has been withdrawn; the other, which is still pending, is for 98 hectares and was made by a company composed of six Americans. An application by a priest of the Catholic Church to purchase 1 hectare of public land for use as a cemetery must be rejected for the reason that there is no provision of law by which the bureau of public lands can dispose of public land for such use.

REASONS FOR SMALLNESS OF OPERATIONS IN PUBLIC LANDS.

Not a single application by a corporation for the purchase or lease of public land has been received. It will be seen, therefore, that the operations in public lands have been ridiculously small. This fact is due to two causes: First, ignorance of the people as to their rights under the public-land act; second, the unfortunate character of the restrictions imposed upon individuals and upon corporations by that act in the matter of the amount of land which they may purchase.

It is certain that a great majority of the common people have at the present time no knowledge of the provisions of law relative to the granting of free patents to native settlers or to the homesteading of public lands.

With a view to having in each province some central point where information, blank forms, etc., may be obtained, and where applications may be filed, the Commission on October 13, 1905, passed Act No. 1404, making each province a land district and each provincial treasurer a local land officer.

Unquestionably our best and almost our only way of reaching the common people is through the public schools.

I have just caused to be prepared a little booklet in four chapters, embodying in the fewest and simplest words possible the essential information as to the way to homestead public lands, the rights of native settlers to free patents and the method of obtaining them, the conditions under which public lands may be leased, and those under which they may be purchased. The information in this booklet is

put in the form of answers to simple questions of a sort that the ignorant and uninformed would naturally ask. The honorable secretary of public instruction will cause the information contained to be taught to school children throughout the islands, and they will be requested to inform their parents as to what they have learned. I also recommend that this booklet be translated into the more important native dialects and widely distributed gratis.

There is one matter to which I desire especially to call the attention of the Commission. With the exception of Chapter V, relative to town sites, which has been applied to Benguet in order to make possible the laying out of a town site at Baguio, no portion of the public-land act has been made effective in Benguet, Nueva Vizcaya, Lepanto-Bontoc, Mindoro, Palawan, or the Moro Province.

The object of keeping this act inoperative in these provinces has the negative one of preventing outsiders from cheating ignorant members of non-Christian tribes out of their holdings until the latter could be given an opportunity to learn something about their rights.

Practically none of these people have titles of any sort. They may, however, under the provisions of Chapter IV of the public-land act, secure free patents to tracts of land not exceeding 16 hectares, which they have been occupying and cultivating for a sufficient period, and the land so secured can not be alienated or encumbered for a period of seven years after the patent issues. I am of the opinion that this chapter should at once be made to apply to all the above-named provinces, and that all persons entitled to secure free patents under it should be encouraged to do so immediately. Urgent reason for not longer delaying action in this matter is found in the fact that under the provisions of the act of Congress application for free patent may not be made by native settlers after July 1, 1907. The chief of the bureau of public lands calls attention to the fact that of the enormous number of persons entitled to free patent throughout the archipelago only 188 have applied, and to the further fact that if the period within which applications may be filed is not extended many persons will fail to take advantage of this liberal provision through ignorance of its existence.

He recommends that Congress be requested to extend the time within which applications for free patent may be made by native settlers to July 1, 1912, and in this recommendation I heartily concur.

I have above referred to the fact that the restrictions imposed by the act of Congress upon the amount of land which may be purchased are preventing sales.

Unquestionably the most harmful of these restrictions is the one which limits the amount of land which an individual may purchase to 16 hectares, or about 40 acres. It has been abundantly demonstrated that there is but one way in which the inhabitants of the Philippines can be taught modern agricultural methods, viz, by the force of example. What is needed more than anything else is a number of farms scattered throughout the islands upon which such methods are employed.

Many Americans would be glad to establish such farms, but under existing provisions of law are absolutely debarred from purchasing public land enough to make it practicable to do so. Cocoanut raising should become a very important industry in these islands, but it takes

trees from six to seven years to come into bearing, and but 75 trees at the outside should be planted to the acre. The average return under very favorable circumstances may be estimated at ₱1 per tree per year, so that the owner of a 40-acre cocoanut plantation must look forward to a wait of six years without income from his trees and must then content himself with an annual maximum income of $1,500 gold, from which the expenses of operating his plantation would have to be paid. In a similar way it may readily be shown that the 40-acre limitation absolutely prohibits the establishment of sugar, coffee, hemp, rice, or cacao plantations. In fact, I know of no tropical crop which can be raised on 40 acres of land which would justify an American in purchasing such a tract and settling upon it.

The rights of the more ignorant and poorer classes have been abundantly protected by the provisions relative to free patents to native settlers and to homesteads. What good reason is there for imposing upon Filipinos or Americans who have the intelligence and means to enable them to purchase land and to successfully cultivate hemp, sugar, tobacco, cocoanuts, maguey, coffee, or cacao a restriction which limits the amount of land they may purchase to 40 acres? I maintain that there is none; that the present policy is ruinous; that it absolutely precludes the possibility of the proper agricultural development of this country; and that the amount of public land which an individual may purchase should be increased to at least 1,000 acres.

There can be no doubt that the prosperity of the country could be further greatly increased if the restrictions upon the amount of land which might be owned or controlled by a corporation were made less severe. It should be remembered that the average Filipino will not cultivate more than 1 hectare of land. The present provisions which give him a free patent to 16 hectares which he has been occupying and cultivating, and which provide against the incumbrance or sale of the land so acquired for seven years, and which further make it possible for him to homestead an additional 16 hectares at a cost of but $10 gold are amply sufficient to protect him in his rights and to supply his every possible need.

But 3,209,546 acres of land are counted as under cultivation to-day, and the fact is that owing to the loss of draft animals the amount actually under cultivation falls far below this figure. When it is remembered that there are some 30,000,000 acres of land, other than forest land, in the Philippines, and that much of the 42,000,000 acres of forest land has rich soil and may advantageously be cleared and cultivated, it will be seen that the surface of this country has as yet hardly been scratched.

It is safe to say that if the changes above suggested in existing restrictions as to the amount of land which may be purchased are made, agricultural development will be greatly stimulated, but the Philippines will still have great tracts of vacant fertile public lands at the end of the century.

Repeated recommendations have been made in the past that the amount of land which a corporation may hold be increased to 25,000 acres. I believe that no harm would result from such a provision, and that 10,000 acres is the minimum amount upon which a corporation could well afford to establish an up-to-date plantation equipped with modern mills, machinery, and implements.

In order to put the matter in concrete form, I suggest that the Commission recommend to Congress the following changes in existing legislation:

Amend section 15 of the act of Congress entitled "An act temporarily to provide for the administration of affairs of civil government in the Philippine Islands, and for other purposes," approved July 1, 1902, by striking out of said section the word "sixteen" and inserting in lieu thereof the words "four hundred and five," and by striking out the words "one thousand and twenty-four" and inserting in lieu thereof the words "four thousand and fifty," so that said section 15 will read as follows:

SEC. 15. The government of the Philippine Islands is hereby authorized and empowered, on such terms as it may prescribe, by general legislation, to provide for the granting or sale and conveyance to actual occupants and settlers and other citizens of said islands such parts and portions of the public domain, other than timber and mineral lands, of the United States in said islands, as it may deem wise, not exceeding four hundred and five hectares to any one person, and for the sale and conveyance of not more than four thousand and fifty hectares to any corporation or association of persons: *Provided*, That the grant or sale of such lands, whether the purchase price be paid at once or in partial payments, shall be conditioned upon actual and continued occupancy, improvement, and cultivation of the premises sold for a period of not less than five years, during which time the purchaser or grantee can not alienate or encumber said land or the title thereto; but such restriction shall not apply to transfers of rights and title of inheritance under the laws for the distribution of the estates of decedents.

Amend section 75 of said act of Congress approved July 1, 1902, by striking out the words "one thousand and twenty-four" and inserting in lieu thereof the words "four thousand and fifty."

FRIAR LANDS.

The contracts by which the government of the Philippine Islands stipulated for the purchase of the friar lands owned by the British-Manila Estates Company (Limited), La Sociedad Agricola de Ultramar, the Recoleto Order of the Philippine Islands, and the Philippine Sugar Estates Development Company (Limited) were printed at length in the report of the United States Philippine Commission for 1903.

The law provides that actual tenants shall be given a preferential right in the matter of leasing and purchasing their holdings. The bureau of public lands has taken possession of the several estates as rapidly as possible, and has issued temporary leases to tenants. The rentals charged have been nominal.

Many of the tenants having long occupied their lands without paying any rental, or having been deceived by unscrupulous lawyers into believing that legal proceedings had resulted in establishing their titles to such lands, were at first unwilling to recognize government ownership. It was deemed essential to secure such recognition from them on the one hand, while on the other it seemed impracticable to fix any permanent rental for their holdings prior to the time when such holdings could be surveyed and the character and value of the land included within each of them determined.

In making out these temporary leases the statements of tenants as to the character and extent of their holdings have been accepted as true. Surveying parties have, however, been organized and put to

work on several of the estates, and the services of an employee of the bureau of agriculture, skillful in determining the value of soils, have been given to the bureau of public lands in order that a satisfactory basis may be obtained for permanently fixing rentals and selling prices.

The following table shows the estates on which temporary leases have been issued, the number of such leases for each such estate, the area leased, and the annual rental at the present temporary rate:

Friar lands temporarily leased.

Estates.	Number of leases.	Area leased (hectares).	Annual rental.	
			Pesos.	Dollars.
S. F. de Malabon	837	1,978.7991	13,169.98	6,584.99
Tala	53	75.9575	432.08	216.04
Piedad	35	82.9300	470.48	235.24
Malinta	68	175.4100	996.08	498.04
Matamo	1	11.8000	68.00	34.00
Dampol	86	127.8365	633.40	316.70
Imus	457	1,515.0418	8,955.52	4,477.76
Totals	1,537	3,967.7749	24,725.54	12,362.77

SURVEYS OF FRIAR LANDS.

The problem involved in the survey of the very numerous small holdings on these estates, which for the most part vary from 2 acres to a few hectares, and which have very irregular boundaries, is a serious one. It is hoped that it may be practicable to induce tenants to readjust their holdings in such a way as to conform approximately to a system of rectangular surveys.

SURVEYS OF PUBLIC LANDS.

Under the law all public land, whether agricultural or mineral, must be surveyed under the direction of the chief of the bureau of public lands before final action can be taken for its transfer to private persons. In anticipation of the large amount of work involved in surveying the friar lands, a large increase in the force of the bureau of public lands has been authorized. If the full number of employees authorized were available the force would be inadequate to perform the work on the friar estates alone, but in point of fact it has not been possible to fill a number of the places which already exist. The work on the friar estates is therefore retarded, while that involved in the surveying of mining claims and of tracts which private persons or unincorporated companies have desired to purchase is badly in arrears. A largely increased force of surveyors must obviously be authorized in the immediate future, but it is anticipated that the demand for engineers created by the Panama Canal construction work and by the extensive irrigation work going on in the United States will render it difficult to secure the men needed.

NECESSITY FOR A COMBINED TOPOGRAPHICAL AND LAND SURVEY.

With each succeeding year the necessity for a general topographical survey of the islands increases. Until this work is done there can be no accurate general mapping of the lands of the archipelago,

either private or public, and the present unsatisfactory conditions arising from issuing patents for tracts of land which are not connected with any point the position of which has been astronomically determined will grow constantly worse.

It is, however, obviously beyond the means of the insular government to undertake and carry out a series of topographical surveys of these islands. Of the several scientific surveys, the making of which at the expense of the United States has been recommended by the President to Congress, none is so important or so entirely beyond the means of the insular government as is the topographical survey, and it is earnestly hoped that Congress may see its way clear to provide for the accurate survey and mapping of the Philippine Islands.

In the annual report of the chief of the bureau of public lands for the year ended August 31, 1905 (Appendix K), will be found detailed information relative to the transfer of public lands, the filing of mining claims, the administration of the friar lands, the administration of the San Lazaro Estate, the examination of Spanish land titles, and the present and proposed personnel of the bureau.

The chief of the bureau of public lands calls attention to the anomalous position in which are placed many men of foreign birth who have served in the Army and Navy of the United States and who have been honorably discharged, but who have failed to complete their naturalization before coming to the Philippines, and who have applied to take up public lands or have located mining claims. Hardly any of these persons are able to afford a trip to the United States for the purpose of complying with the law in regard to naturalization, and after years of honorable service under the American flag they find themselves deprived of the privilege of taking up government lands in these islands.

I recommend that the Commission request Congress to make such change in existing legislation that men who have served in the Army or Navy of the United States and have been honorably discharged may purchase or homestead public lands and locate mining claims.

BUREAU OF AGRICULTURE.

Some results of far-reaching importance have been obtained by officers and employees of the bureau of agriculture during the past year.

KAPOK.

The chief of the bureau, knowing that kapok or tree cotton was produced in considerable quantity in the islands, has investigated its use and its price in the United States market. He finds that a pound of kapok makes as large and as good a pillow as do 2 pounds of feathers, and even at American prices costs but one-eighth as much. Also that kapok will buoy up thirty-five times its own weight in water and does not become wetted after long submersion. A French society, in making experiments with it as life-saving material, proved that after soaking eighteen hours a small mattress would still support several men. The fiber is extraordinarily elastic and seems to retain its elasticity indefinitely. It is very valuable for use in fine upholstering, and should be one of the best of substances for preparing comforts for covering in cold climates. Probably 1,000,000 pounds of it go to

waste annually in the Philippine Islands. It may be had here in abundance at about 5 centavos per pound in the seed, the seed making up about 63 per cent of the total weight. A McCarthy cotton gin readily cleans it from the seed. The New York price is 12 to 13 cents gold.

The seed has been analyzed at the bureau of government laboratories, and was found to be 38 per cent richer in oil than is ordinary cotton seed. It has a fertilizing value of about $17 gold per ton, and has been fed with advantage to different kinds of stock by the bureau of agriculture.

The kapok tree is possessed of extraordinary vitality. The trunk, if cut down during the rainy season, trimmed of all branches, and set in the ground, will send out roots and grow, while single branches stuck into the ground at this season promptly take root and soon grow into trees. The trees require absolutely no care, and the pods containing the cotton fall to the ground when ripe.

There are vast areas in these islands perfectly suited to the growth of this valuable fiber-producing tree, and an important kapok industry should be developed in the near future.

SISAL HEMP.

The plant commonly known as maguey, from which sisal hemp is derived, has been found growing practically wild in many widely separated parts of the islands. We have positively determined that it is the Agave rigida of the botanist, or, in other words, that it is the true Yucatan fiber plant from which most of the world's binder twine is made. It was doubtless introduced here by the Spaniards. It is at present grown commercially only in North and South Ilocos, where the people rot the leaves in water until the pulp will shake out from the fiber and then dry and brush the fiber and market it. It is known in the world's markets as Manila aloe fiber, this fact being probably due to the wretched cleaning method, which makes it resemble the inferior aloe fiber of commerce.

Maguey grows especially well on islands where limestone rock comes near to or reaches the surface and where the soil is largely made up of the decomposition products of this rock. It is unharmed by drought, is not subject to the attacks of locusts or other insect pests, does not require the use of draft animals for its cultivation and, in short, is perfectly adapted to the conditions which prevail in the islands of Cebu, Bohol, and Siquijor. These islands are densely populated and are at present very poor. There seems to be no good reason why a profitable fiber-growing industry might not be established there, and if this can be done they should become as prosperous as are the provinces of Leyte and Albay. A determined effort will be made to interest the people of these islands, as well as those living along the sandy shores of the archipelago, in the cultivation of maguey. Young plants may be had in great abundance. Numerous machines have been perfected for cleaning the fiber, and several of them are so inexpensive as to come within the reach of comparatively poor persons.

A large number of spineless Bahama maguey plants have been successfully introduced from Hawaii, and are now growing nicely at several widely separated points in the archipelago.

POWER MACHINES FOR CLEANING ABACA (MANILA HEMP).

Great progress has been made in the development of power machines for the cleaning of abaca during the past year. The machine invented by Mr. Lindsay, to which reference was made in my last annual report, has been further perfected and is now being put to practical test. It turns out beautifully clean fiber, and when some minor defects have been remedied will doubtless produce it upon a commercial scale.

A simple maguey-cleaning machine brought from Yucatan has also proved to embody a principle which may be most advantageously used in cleaning abaca. This machine consists of a large, broad-rimmed wheel on the margin of which are set at frequent intervals blunt-edged brass knives; a grooved shoe moved by means of a lever is so adjusted that it may be thrown against the knives. The leaf to be stripped is fed in between the shoe and the knives and is then brought against the latter by the lever which moves the shoe. Entire leaf petioles may be fed to it, and the necessity for the preliminary separation of the petioles into fiber strips and waste is avoided This machine extracts fully 100 per cent more fiber from the petioles than has thus far been obtained with any other stripping device, and a suitable modification of it should produce clean fiber of first-class quality in very large quantity at small expense.

When it is remembered that about 65 per cent of the total value of Philippine exports are in abaca, the importance of introducing a simple and inexpensive machine, which will double the output and greatly improve the quality of fiber from the area now under cultivation, will be appreciated.

I confidently anticipate that within the coming year the problem of devising a satisfactory power machine for cleaning abaca will have been satisfactorily solved.

Investigations begun by the bureau of agriculture and continued by the bureau of laboratories have demonstrated the fact that the waste from both hand and machine stripped abaca is a very valuable material for use in paper making.

DAIRY HERD.

In my last report I referred to the disastrous results which followed the attempt to inoculate against rinderpest dairy animals imported from the United States. The survivors of this herd have kept well and have produced large quantities of milk of excellent quality, which has been used at the civil hospital and the cholera hospital and has saved many lives.

A number of Australian cows have been added to the herd, which is now steadily growing. An order has been placed in Australia for a number of heifer calves from dairy cows, it having been found much easier to immunize young imported animals than adults. These calves will first be immunized against rinderpest, will then be used for the production of vaccine virus, and will ultimately be turned over to the bureau of agriculture to be raised for dairy animals.

The chief of the bureau, in spite of many discouragements, is con-

fident of his ability ultimately to build up a large herd, and I have no doubt that he will succeed in doing so. Such a herd in the immediate vicinity of Manila will be a great boon to the public.

OTHER WORK IN ANIMAL INDUSTRY.

A large consignment of 40 mares ordered for use at experiment stations of the bureau of agriculture arrived on the *Dix* in August, 1904. On the same boat came 11 stallions and 8 jacks, which had been ordered for the insular purchasing agent to fill requisitions made upon him by provinces a long time previous to the placing of the order. This consignment of stallions had been selected with great care, and contained a number of magnificent animals of suitable size for breeding to native mares, among which were 3 Arabs and a Morgan. There were also some fine stallions for use with American mares. The provinces for which these stallions and jacks were originally ordered were unwilling or unable to take them, and they were left upon the hands of the insular purchasing agent. Six of the jacks promptly contracted surra. At my request the remainder of the jacks and the stallions were turned over to the bureau of agriculture. Two of them were sent to the government farm at Batangas and 2 to the government farm at La Carlota, in western Negros; 1 was sent to Capiz, 1 to Sibuyan, 1 to Masbate, and 1 to Camiguin, where they were placed in the hands of competent persons to be used for the benefit of the general public. The remaining stallions and 10 carefully selected American mares were sent for the time being to the government rice farm at Murcia, in Tarlac, to be kept there until the condition of the roads in Pangasinan should so improve that they might be sent on to Baguio, where it was decided that an experimental stock farm should be established. Dr. H. L. Casey, who brought this shipment of horses from the United States, and who had been appointed director of studs, accompanied them.

Shortly after they arrived at Murcia surra broke out among the farm animals on the place, and it became necessary instantly to remove the valuable breeding stock in order to prevent danger of infection. There was no time to wait for roads to improve or for the erection of stables at Baguio, and in less than twenty-four hours after the news of the appearance of surra at Murcia had reached me the stallions and mares were on their way toward the mountains. They arrived safely, and as soon as practicable temporary stables were erected on an excellent site.

Baguio was chosen as the site for an experimental stock farm because surra had never appeared there, while the grazing is excellent throughout the year and climatic conditions were believed to be especially favorable to the raising of horses and cattle. It was not, however, deemed advisable to conduct an experiment on a very large scale at the outset lest some unexpected difficulties should result in serious loss to the Government.

The horses at Baguio have now passed through one dry season and one wet season. They have kept in magnificent condition and have been entirely free from disease. The colts foaled are doing splendidly.

Later there were imported 12 burros, 2 of which were jacks. One of the jacks died at Dagupan on the way to Baguio, and the other shortly

after arrival there. The remaining animals quickly became acclimated and have since flourished. Another jack has been secured and foals born at Baguio have thrived. There seems little doubt that burros will flourish in the mountain regions of northern Luzon, and that the problem of securing pack animals which can live off the country and which can be successfully used on rough and stony trails can be solved successfully by their use.

One of the stallions originally stationed at Baguio has been sent to Lepanto to be bred to the fine native mares of that province, and a number of native mares have been purchased for the Baguio station.

Several young beef bulls have been imported from the United States and from Australia, and have been placed at favorable points in Benguet, Lepanto, and other provinces.

Berkshire hogs are being successfully bred at the Singalon station at Manila, and the bureau of agriculture is quite unable to fill the existing demand for young boars.

The first cross between the Berkshire boar and the native sow produces striking improvement in the offspring of the latter.

The natives were at first afraid to breed their mares to the imported stallions, but now that a number of native mares have been successfully delivered of fine foals sired by American stallions the prejudice is rapidly disappearing. At Cervantes, in Lepanto, the Igorots are having the scrub stallions which have heretofore run with their mares castrated, and are taking great pains to breed their mares to the fine stallions stationed there. They have also built a stable and fenced in a pasture for the beef bull sent there by the Bureau of Agriculture, and are bringing their cows to this pasture in order that they may run with the bull.

In brief, the results of the experiments thus far conducted in the introduction of imported stock for breeding purposes are highly encouraging. It is quite impossible to meet existing demands with the stock at present on hand, and I urge that the Commission appropriate $10,000 gold for the purchase of additional animals during the present fiscal year.

Attempts to breed American mares in the lowlands have resulted disastrously, glanders having broken out among those stationed at La Carlota and surra among those stationed at Murcia. I am more than ever convinced that all important horse-breeding operations carried on by the government should be conducted at Baguio or elsewhere in the mountains of northern Luzon, and that there should be established at Baguio a reserve station from which male animals may be sent wherever they are needed for breeding purposes. There will inevitably be considerable loss from disease among those thus sent out, but we can, nevertheless, in this way bring about marked and rapid improvement in the native stock.

Beef bulls may be successfully immunized against rinderpest, and may then be sent anywhere in the islands with comparatively little danger of death from disease.

An excellent permanent site for a stock farm has been selected in a sheltered and well-watered valley conveniently near the experiment station in the Trinidad Valley, on which fodder and corn may be grown. The temporary stables at Baguio will be transferred to this site during the present year and a beginning made toward the establishment of a permanent station.

TRANSFER OF VETERINARY DIVISION FROM BOARD OF HEALTH.

As previously stated, the veterinary division of the board of health has been transferred by law to the bureau of agriculture.

While this division has had charge of meat inspection at Manila and the combating of surra, glanders, and other diseases, its most important function has been inoculation against rinderpest. This, the worst of all cattle diseases, is said to have appeared in the Philippines in 1888. It steadily spread through the islands until active steps were taken by the American Government to check it by inoculation, and during the war, when disturbed conditions prevented the ordinary precautions of isolation and quarantine, it caused tremendous loss to owners of cattle.

INOCULATION AGAINST RINDERPEST.

Late in the year 1902 the manufacture of antirinderpest serum was begun by the bureau of laboratories. This serum, if injected hypodermically in proper quantity, affords a temporary immunity against rinderpest, which ordinarily lasts from one to two months. Permanent immunity may be secured through inoculation by the so-called "simultaneous method," which consists in injecting 1 c. c. of virulent blood from a sick animal on the one side and 30 c. c. of serum at the same time on the other. The result is ordinarily a very slight attack of the disease, which does not prejudicially affect the general health of the animal inoculated and confers permanent immunity.

The difficulty involved in this method arises from the varying susceptibility of individual animals to rinderpest. The majority of Philippine cattle may be classified as normal, and with normal individuals inoculation by the simultaneous method is uniformly successful. Some animals, however, have a greater or less degree of natural immunity. This fact is discovered when they are inoculated by the simultaneous method for the reason that they fail to develop fever. The operation is then repeated until they do react, more virulent blood and less serum being used each time. A small percentage of animals are, however, highly susceptible. With this class the usual dose of serum fails to hold the disease in check and it may terminate fatally.

The percentage of mortality which may be expected has been found to vary widely in different countries and with different breeds of cattle, this variation depending partly upon varying susceptibility to rinderpest and partly upon complications with other cattle diseases generally prevalent in the countries in question.

The first simultaneous field inoculations in the Philippines were carried on by veterinarians employed by the bureau of laboratories, and were extremely successful, the mortality being only 3.44 per cent.

Under general provisions of law, the board of health for the Philippine Islands was charged with the combating of infectious diseases of animals. During my absence in 1903 the commissioner of public health insisted quite strongly that cattle inoculation be turned over to the board of health. This was done, and a veterinary division was established in that bureau.

In my opinion, sufficiently careful supervision has not been exercised over the veterinary division. In at least two instances veter-

inarians did careless work, which resulted in heavy mortality and created strong local prejudice against the inoculation. The corps apparently became alarmed, and the simultaneous inoculation was abandoned and serum alone was employed to stop the spread of the disease. This change of policy was adopted without my knowledge or approval. It of course pleased the more ignorant owners of cattle, who were delighted when the spread of the disease was promptly checked in their herds by the use of serum, with no mortality among animals not actually infected at the time of inoculation, while some 60 per cent of the infected animals were cured.

If the insular government had abundant means and the necessary corps of veterinarians, it could unquestionably protect the cattle of the Philippines against rinderpest by inoculation with serum alone, but the expense involved would be enormous, for the reason that the immunity conferred is only temporary, and after two or three months rinderpest is likely to reappear in the very herds where it has been checked. If permanent results are to be secured, the simultaneous method, or some modification of it, must be employed.

Recently two important additions have been made to our knowledge relative to the use of antirinderpest serum. One is that the serum may be used not only as a preventive agent to protect well animals, but also as a curative agent for those actually diseased. For the latter purpose it is best to inject directly into the jugular vein. The chief veterinarian states that of the infected animals treated with serum only 40 per cent have died, as against approximately 85 per cent of those not so treated. In other words, 60 per cent of the animals treated have been saved. The second discovery of importance is that if serum be used upon an animal on a given date and virulent blood be injected ten days or two weeks later, permanent immunity is secured and the percentage of mortality is reduced, with Philippine animals at least, practically to zero. At the serum laboratory, where this method is now exclusively used, not a single animal has been lost during the past year as a result of inoculation.

There is not the slightest doubt as to the efficiency of inoculation by the simultaneous method or by the modification of that method above referred to, and complete demonstration of this fact is furnished every day at the serum laboratory, where it is necessary to keep constantly on hand a supply of animals suffering from rinderpest in order that virulent blood for the making of serum may be available. The whole place is so infected with the disease that if animals which have not been immunized are brought there they promptly sicken and die. Immunized animals, however, may be and are kept there constantly and never contract the disease.

It may therefore safely be said that the problem of doing away with rinderpest in these islands reduces itself to one of administration and of overcoming popular prejudice where such prejudice exists. The latter difficulty is not of a permanent nature. When the people once become familiar with the results of inoculation they are no longer opposed to it. In point of fact, requests for inoculation have come in during the past year far more rapidly than they could be acceded to.

The administrative problem, which involves keeping the veterinarians supplied with serum at remote points in the archipelago and the exercise of necessary supervision over their operations, presents

no insuperable obstacles, especially as the serum will under reasonably favorable circumstances keep six months.

Were it possible in the provinces to use serum first and follow it after a suitable interval with virulent blood a good deal of loss to property owners might be saved, but this is difficult, especially in the case of the more ignorant classes, who are satisfied to have their animals temporarily protected against the disease by serum, and are unwilling to return them for inoculation with virulent blood.

At the present time veterinarians are instructed to use serum inoculation on herds in which rinderpest has appeared, as inoculation of diseased animals by the simultaneous method would be apt to result fatally. The use of the serum temporarily protects the animals which are not infected and cures many of those which are actually diseased. After a suitable interval the veterinarians then return and inoculate all of the animals with virulent blood, thus conferring permanent immunity upon them.

In the event that a property owner will not consent in advance to subsequent inoculation with virulent blood, veterinarians are instructed to decline to use serum on his herd. All inoculations of animals belonging to herds which are free from disease are by the simultaneous method, or with serum followed by blood, as circumstances make necessary.

Especial attention is being given to inoculation of animals in the sugar and hemp producing provinces. In western Negros the systematic inoculation of all cattle in the province has been requested by the people, and is being performed with the cooperation of the provincial and municipal authorities. The islands will be covered, province by province, as rapidly as circumstances will permit. During the year rinderpest has been temporarily checked in 22 provinces.

The disastrous results of attempting inoculation of the recently imported dairy herd against rinderpest caused groundless loss of confidence on the part of many persons in the efficacy of this treatment. It should be remembered that these inoculations were made on animals which had come from a country where the disease had never existed, and which had just made a long overland journey followed by a sea voyage of 10,000 miles. The results made it evident that much greater care was necessary in dealing with such animals, but threw no light on the question of the value of simultaneous inoculation in dealing with rinderpest among Philippine cattle under ordinary conditions. Conclusions on the latter subject must be drawn from actual experience, the results of which have been such as to afford an overwhelming argument in favor of the inoculation.

USE OF MODERN FARM MACHINERY.

The use of modern farm machinery upon the government rice farm at Murcia has attracted wide attention, and many hundreds of persons have gone there to see the steam plow and thrasher, the reapers, and other machines in operation. These exhibitions have resulted in the placing of large orders for farm machinery in America.

Recently two sugar planters from eastern Negros visited the rice farm and immediately afterwards placed orders for steam-plowing outfits similar to the one there in use. The steam plow has proved a decided success. Its mechanism is simple, it is easy to operate, and

does not readily get out of order. It can be successfully used on ground which is quite rough, and will climb steep banks with ease. It will also readily go through mud holes if small tree trunks on which the driving wheels may grip are thrown into the mud.

With a gang of 7 plows 12 acres of land may readily be plowed in a day, and with an acetylene headlight it is entirely practicable to operate the plow at night on fairly level ground. Harrows may be attached behind the plows, and the ground plowed and harrowed at a cost of about $1.80 gold per acre.

The steam plow is especially effective in land which has been invaded by cogon grass. When this grass has once become fairly established it is almost impossible for the native, with his rude agricultural implements, to dislodge it, but when cogon lands have been burned over the steam plow will break them up perfectly.

Ability to plow the land is of fundamental importance in reestablishing agricultural prosperity in these islands. Plowing once accomplished, nature, aided by such assistance as can be furnished by hand labor, may be depended upon to do much; but without plowing it is impossible to plant, and the existing scarcity of draft animals makes plowing very difficult.

PURCHASE OF STEAM PLOWS RECOMMENDED.

The chief of the bureau of agriculture expresses the opinion that a few steam plows, centrally located and properly operated, could be made to aid greatly in bringing much larger areas of land under cultivation. I heartily concur in this opinion and suggest to the Commission the advisability of purchasing several additional outfits. If arrangements can be made with property owners whereby they will furnish wood for fuel and water for the boilers, together with a few common laborers, a charge of 60 to 80 cents gold per acre would compensate the government for the use of a steam plow and the hire of a suitable engineer to operate it.

For further information relative to the matters above discussed and to experiments in the introduction of jute, the growing of cassava for starch, the growing of wrapper tobacco under shade, the growing of American corn, cowpeas, imported varieties of peanuts, Kaffir corn and other products, and the operations of the several experiment stations and farms of the bureau of agriculture, reference is made to the annual report of the chief of the bureau for the year ending August 31, 1905 (Appendix N).

PHILIPPINE WEATHER BUREAU.

The work of the weather bureau during the past year has been of a highly satisfactory character. The Rev. José Algué, director of the bureau, has been absent for a considerable part of the year, first at St. Louis, where he installed a very successful meteorological exhibit, and later in Austria and Spain, where he went to represent this government at the International Congress of Meteorologists at Innsbruck, and to observe in Spain the total eclipse of the sun on August 30, 1905. During his absence the Rev. Miguel Saderra Mata has served as acting director and has efficiently performed the duties of the office.

METEOROLOGICAL EXHIBIT AT ST. LOUIS.

The weather bureau exhibit at St. Louis proved a great success. It was awarded a grand prize for the large relief map of the archipelago, measuring 110 by 75 feet; a grand prize for a model meteorological station; a grand prize for new meteorological instruments invented by Father Algué, viz, the barocyclonometer and the refracting nephoscope; a gold medal for the improved microseismograph constructed by the mechanics of the observatory; a gold medal for a collection of maps exhibited by the observatory; a gold medal for the seismographic pendulum invented by the Rev. Mariano Suarez, S. J., and a silver medal for publications of the bureau.

STORM WARNINGS.

Besides the ordinary daily dispatches to China, Formosa, and Japan and the typhoon warnings within the archipelago, 18 special typhoon warnings have been issued to foreign centers.

Although all telegraphic communication was interrupted and the observatory was thus cut off from the outlying stations and forced to depend strictly upon its own instruments, timely warning of the approach of the destructive typhoon of September 26 was given at Manila and much loss of life prevented. The difficulty experienced in spreading the notice among the people of the city after it was known that the storm would be destructive has led the acting director of the bureau to suggest that police stations be provided with simple sets of typhoon signals, and that police officers be instructed to go from house to house and warn the people should the city again be threatened. Many native houses would doubtless have been firmly braced, and thus saved from destruction during the recent storm, had the warning from the observatory been more promptly circulated.

WORK OF ASTRONOMICAL DEPARTMENT.

Owing to the fact that research in astronomy does not fall within the scope of the official duties of the weather bureau, the members of the staff can not devote their time to it, and the fine equipment of the Manila astronomical observatory has been little utilized throughout the past year. It is understood, however, that the services of an astronomer will soon be secured without imposing any expense upon the insular government.

Thus far nearly all of the official work of the astronomical department has been in connection with the time service. Two curious incidents have happened to the observatory timepieces during the year. The earthquake of January 27, 1905, stopped all the pendulum clocks except the sidereal clock and the new "Riefler" mean-time clock. The chronometers were not affected by this shock, but their turn came in April. From the 7th to the 9th of this month all of the chronometers in the observatory and the 14 chronometers in the equipment department at the naval station at Cavite as well made a most puzzling run. The only explanation which has been offered assigns as the cause of this extraordinary phenomenon the abnormal changes in meteorological conditions at that time; but this explanation is not satisfactory, especially as transit observations showed that the observatory clocks were not disturbed.

WORK OF SEISMIC DEPARTMENT.

Systematic seismic observations have been continued as heretofore. The great Indian earthquake of April 4 was recorded here at 58 minutes and 25 seconds after 8 p. m. The local earthquake of January 27, 1905, probably had its center near the Zambales Mountains. It terrified many persons, but did no serious harm.

A new Vicentini microseismograph, made at the weather bureau, has been installed during the year.

WORK OF MAGNETIC DEPARTMENT.

The work of the magnetic department had previously been greatly interfered with by the erection in its vicinity of extensive stables with galvanized-iron roofs. The removal of these stables made possible the continuance of magnetic observations without serious interruption up to the time when the Manila Electric Street Railway and Light Company began to operate its cars, rendering further magnetic work at the Manila station practically impossible.

IMPROVEMENTS.

Many important improvements have been made at the Manila observatory during the past year, which have, however, involved practically no expense to the insular government. The most important of these is the installation of a new astronomical clock for mean time, made by the firm of Clemens Riefler, of Munich, universally acknowledged to be the best of the clock-making concerns. It will now be readily possible, by establishing electric connections with this clock, to have accurate standard time at all government buildings in the city of Manila, and the plans for such an arrangement will be submitted to the Commission in the near future.

The two steel towers which flanked the building of the weather bureau at St. Louis have been brought to Manila and erected on the observatory grounds. Here, as in St. Louis, they carry the copper collecting wires of the ceraunographs or lightning recorders.

CHANGES IN PROVINCIAL STATIONS.

Little change has been made in the weather stations in the provinces, although the second-class station at Daet, Ambos Camarines, has been temporarily suspended.

Valuable assistance has been rendered by voluntary observers, who have been provided with necessary instruments.

INSPECTION OF PROVINCIAL STATIONS.

One general inspection trip has been made to the stations in the central and southern islands during the year. Its results were such as to make it evident that it would be economical for the government to appropriate sufficient funds to make possible more frequent inspections of all provincial stations.

Two new stations have been established, one on the island of Guam and one on the island of Yap. These stations, owing to their favor-

able location to the east of the Philippines, are of the greatest importance, and valuable information has been received from them relative to the movements of typhoons long before the approach of these storms could have been indicated by the instruments at any station in the Philippines.

BETTER TELEGRAPHIC COMMUNICATION NEEDED.

To complete the system very satisfactorily it would only be necessary to have telegraphic communication with two stations on the east coast of Mindanao, one on the east coast of Samar, and one on the east coast of northern Luzon. This, however, is not feasible until the present telegraph or cable system shall have been extended. Stations at Puerto Princesa, in the island of Palawan, and Cape Melville, island of Balabac, would also be very useful were cable or wireless telegraphic communication established with these points.

IMPROVEMENT OF CROP SERVICE.

The director of the weather bureau has submitted to the secretary of the interior a plan for greatly improving the present system of crop reports without imposing much additional expense upon the government.

Much additional information relative to the work of the weather bureau will be found in the report of the acting director for the year ending August 31, 1905 (Appendix L).

ETHNOLOGICAL SURVEY.

The appropriation bill for the fiscal year ending June 30, 1905, authorized the employment of three men to do scientific work in ethnology, an increase of one over the number authorized for any previous year. The chief of the survey was, however, sent to St. Louis to arrange and take charge of the Philippine exhibits and did not return until January 27, 1905. Shortly after his return he was taken seriously ill and remained in precarious health until his resignation on August 3, so that there have been but two men at work in the islands, each of whom has spent about five and one-half months in the field and the remainder of his time at Manila.

WORK OF DOCTOR MILLER.

Dr. E. L. Miller, acting chief during the absence of Doctor Jenks, was sent by me on three expeditions to make investigations relative to the condition of the wild tribes and to report upon feasible measures for improving their condition.

On the first of these trips he went to San Fernando, in the province of La Union, and thence proceeded northward, visiting the settlements of non-Christians in the province of South Ilocos and the southern portion of North Ilocos.

The civilized inhabitants of South and of North Ilocos were sending in petitions that the Tinguianes of these two provinces be placed under the jurisdiction of the regularly organized municipalities, and were maintaining that such a course would be to the advantage of the wild people, and that the latter desired it.

Doctor Miller reported that the Tinguianes were very strongly opposed to any arrangement which would bring them under the control of the civilized natives and that any such arrangement would be likely to result in their being oppressed and robbed. Necessary legislation was therefore adopted to enable them to establish local governments of their own in their several settlements.

As a result of maltreatment at the hands of their civilized and Christianized neighbors, a part of the Igorots of the province of La Union have now been placed under the jurisdiction of the governor and provincial board of Benguet and the remainder under that of the lieutenant-governor of the subprovince of Amburayan and of the governor and the provincial board of the province of Lepanto-Bontoc, to which Amburayan belongs. The Tinguianes of South Ilocos have been placed under the immediate jurisdiction of the lieutenant-governor of Abra, and provision has been made for organizing all their settlements, as well as the settlements of Tinguianes in South Ilocos, under the provisions of the township government act (No. 1397).

Having concluded his investigations in North Ilocos, Doctor Miller went to Bangued, in the province of Abra, and thence, by way of San José and Tui (Ituy), proceeded eastward to the great Central Cordillera, crossed Mount Pico de Loro on foot, and made his way without escort through the very wildest part of the province of Bontoc, visiting Balbalasan, Guinaang, and Labuagan, and proceeding thence to Bontoc and Cervantes. From Cervantes he went south through the provinces of Lepanto and Benguet to Baguio, and from Baguio to Manila.

Soon after his return the delegations of wild tribes returned from St. Louis. Doctor Miller took charge of them upon their arrival at Manila, and a little later proceeded with the Bagobos to Zamboanga and to their homes at Davao. In the latter district he visited the country of the Bilans, a tribe inhabiting the hills some 15 miles south of Santa Cruz.

Soon after his return I sent him to investigate and report upon the condition of the wild people in the provinces of Iloilo, Capiz, and Antique, in the island of Panay. Starting from the town of Iloilo, Doctor Miller made his way overland to Capiz by way of Janiuay, Tapas, Dao, and Dumalag. He then twice attempted to cross the mountains into Antique, but owing to the activity of ladrones and of the constabulary who were pursuing them, he found it impossible to secure guides. He therefore proceeded from Capiz to Jamindan by way of Mambusao and Jagnaya, through a country inhabited by the so-called "Monteses," "Bukidnon," or "Mundos" of northern Panay. Having spent as much time as was necessary among these people, he went down the Aclan River to Calivo, and thence by way of Buruanga to Pandan in the province of Antique.

On the island of Buracay, opposite the barrio of Caticlan, he found quite a colony of Negritos.

From Pandan he continued down the coast to the capital of Antique, finding a considerable number of Negritos between Pandan and San José. He reports other Negritos near San José and a considerable number of them in the basin of the Sibalom River.

Doctor Miller returned to Manila late in May, and on the 1st of July left at my direction to make investigations among the Bukidnon of Misamis. A number of settlements of the latter tribe were inad-

vertently thrown into the Moro Province when the boundary line between Misamis and the Moro Province was established, and as it was impracticable for the authorities of the Moro Province to get at them, and as the authorities of the province of Misamis, who had heretofore governed them, no longer had jurisdiction over them, they were left without any government whatever. There was a radical difference of opinion between the authorities of the two provinces as to what should be done with these people, and Doctor Miller was sent to Misamis in order that he might carefully investigate the matter on the ground. Upon his return he reported that it was more than doubtful whether the settlements in question were not actually within the territorial limits of Misamis and strongly advised that the Bukidnon be in any event considered to belong to Misamis for governmental purposes. The necessary resolution to secure this end has been drafted and submitted to the Commission.

Doctor Miller's work has been uniformly of the highest character. He is a tireless and fearless traveler, making long marches on foot through the wildest country when horses can not be had. When sent out to make investigations he has invariably secured the information desired, and his recommendations have commended themselves to me in every case.

WORK OF MR. CHRISTIE.

Mr. Christie spent about half of the year in the field among the Subanos of the district of Zamboanga, in the island of Mindanao, and is now preparing the results of his work for publication.

PUBLICATIONS OF THE SURVEY.

Prior to the year just passed practically nothing was published by the ethnological survey, the time of its officers and employees having been spent almost entirely in the field and in preparing the exhibit for the Louisiana Purchase Exposition. During the past year a large amount of material has been prepared for the press.

The status of the publications of the bureau at present is as follows:

Volume I, "The Bontoc Igorot," by Dr. Albert E. Jenks, the former chief of the survey, appeared in April, 1905. This is a very instructive and copiously illustrated volume containing a large amount of accurate information relative to the interesting tribe with which it deals. There has been great demand for it both here and in the United States.

Part 1 of Volume II, "The Negritos of Zambales," by Mr. William A. Reed, a former employee of the survey, appeared in February, 1905.

Part 2 of Volume II, entitled "The Nabaloi Dialect of Benguet," by Otto Scheerer, will be of great value to students of Philippine dialects. This work is completed, except for the printing of the index.

Part 3 of Volume II, entitled "The Bataks of Palawan," by Lieut. E. Y. Miller, the governor of that province, is printed and ready to distribute.

The Spanish edition of Volume III, entitled "Relaciones Augustinianas de las Razas del Norte de Luzon," compiled by the Augus-

tinian Friar Angel Pérez, has been published. It consists of an interesting series of letters from Spanish missionary priests and contains much matter of historical importance, as well as lengthy accounts of church mission work. The use of this manuscript was secured on the condition that it be published in Spanish. If an English edition is published it will doubtless contain only those portions of the letters and reports which deal more directly with the history of the wild tribes of northern Luzon.

Part 1 of Volume IV, entitled "History and Laws of the Moros," by Dr. N. M. Saleeby, contains a large amount of important information relative to the Moros of the southern Philippines. It deals with the first 15 of a set of 33 manuscripts, which are the property of the survey. The proof of this part has been received and it should appear within two months. The work of publishing the remaining manuscripts would have been similarly advanced at this time had Doctor Saleeby not offered to include in the second part of this volume an account of the several Moro tribes, their languages, the districts which they occupy, etc., based upon his personal investigations in the field. It is expected that the manuscript of this part will be ready for transmission to the printer in the very near future.

Part 1 of Volume V, entitled "The Tinglayan Culture Area," by Daniel Folkmar, lieutenant-governor of the subprovince of Bontoc, deals with a heretofore practically unknown people in a country immediately adjoining the Bontoc culture area. Manuscript of this paper is ready for the printer.

The papers now in manuscript or published represent the results of three years of hard and persistent work. It is regretted that they could not have begun to appear at an earlier date, but circumstances were such as to make this impracticable.

ETHNOLOGICAL COLLECTIONS.

A large amount of valuable ethnological material has been brought back from St. Louis. It is greatly to be regretted that there is no suitable place available where it can be exhibited, and that it must for the present necessarily be stored in rooms in the Oriente Building.

It is greatly to be hoped that it may be possible to erect a suitable museum building at Manila in the not very distant future so that the extremely valuable and interesting collections of ethnological, zoological, botanical, and mineralogical material already on hand may be made accessible to the public.

For a full account of the work of the ethnological survey reference is made to the report of the acting chief for the year ending September 1, 1905 (Appendix M).

THE COMMERCIAL MUSEUM.

The work of the commercial museum has continued during the past year along the same lines as heretofore. The number of exhibits has increased until it has become impossible to display those already on hand, while there have been received numerous requests for space which could not be granted.

There can be no doubt that a well-conducted commercial museum, with proper space for exhibition purposes and the necessary financial

support, would be of great assistance to American merchants in introducing their goods here and of equal assistance to prospective investors by showing them the products of these islands and furnishing them with reliable and comprehensive information relative to the places where such products can be obtained, the means of acquiring them, and their cost.

Unfortunately, however, the insular government absolutely lacks space in which to install exhibits and can not at present spare the funds with which to erect a museum building. It has therefore been decided to discontinue the museum until suitable exhibition space can be assured.

GOVERNMENT OF NONCHRISTIAN TRIBES.

It is impossible to state with any very close degree of approximation the number of the non-Christian inhabitants of the Philippine Archipelago. In some provinces efforts were made to enumerate the non-Christian inhabitants at the time the last census was taken, but in such regions as the eastern part of northern Luzon and the northern part of the Central Cordillera of the same island, the interior of Mindoro, the greater part of the island of Palawan, the mountains of Panay, and the interior of Mindanao any attempt at actual enumeration was out of the question. It is safe to say, roughly speaking, that there are approximately 1,000,000 non-Christians in the archipelago or, in other words, that they constitute about one-eighth of the entire population.

They are divided into numerous tribes, each with its distinct language and its peculiar customs. Some of them are pacific and gentle in the extreme, while others are very warlike. Some of the tribes, such as the Tinguianes of Abra, are in many ways quite as civilized as their Christian neighbors; while others, like the Negritos, seem wholly incapable of attaining any considerable degree of civilization.

Under the Spanish régime nearly all the settlements of non-Christians which were governed at all were placed under the control of the municipal authorities of the Christian pueblos, who took advantage of their ignorance and timidity to impose on them in many ways, robbing them of their horses and cattle, and sometimes even of their crops, under the flimsiest pretexts. They were not infrequently required to perform road work which others should have done, and to pay taxes which others owed. As the acceptance of Christianity was a necessary prerequisite to admission to the schools, the vast majority of them remained illiterate; nor did their troubles end here. Children and even adults were not infrequently purchased or stolen by Christian natives and were kept in what amounted to a state of slavery under the guise of Christianizing them. Abuses committed by civilized natives upon the warlike tribes led to reprisals, which in northern Luzon usually took the form of head-hunting expeditions.

In this region comparatively little attempt was made by the Spanish Government to check intertribal or intersettlement warfare, with its attendant head-hunting and its long train of resulting miseries.

Most of the actual work on behalf of the wild people was done by priests of the Catholic Church; and the Jesuits in Mindanao displayed especial activity in this direction, persuading many of the mountain peoples to occupy sites of fertile land in fairly accessible

regions and to abandon their warlike pursuits and adopt the life of peaceful agriculturists.

At the time of the establishment of civil government it was evident that no class of people were in greater need of protection and assistance than were the non-Christian inhabitants. The first provincial government established (Act No. 49) was that of Benguet, a province which was then inhabited almost exclusively by Igorots. The first township governments were established for the settlements of this same tribe (Act No. 48).

No further special legislation with reference to non-Christian tribes was enacted until some time after the provincial-government act and the municipal code had been passed and civil government had been established throughout practically all of the more settled provinces.

The special Benguet acts above referred to were somewhat hastily adopted and were crude in many ways. On January 28, 1902, there was passed an act (No. 337) providing for the establishment of a provincial government in Nueva Vizcaya, and on April 9, 1902, an act (No. 387) passed providing for the establishment of local self-government in the townships and settlements of this province, which had a population of 16,000 Christians and 62,000 non-Christians, the latter divided between two important tribes, both of which were "head-hunters." These two acts were prepared with much care and were intended to serve as models of acts for other provinces where conditions were similar to those in Nueva Vizcaya.

The Nueva Vizcayan provincial act was subsequently applied, with slight variations, to Lepanto-Bontoc, Mindoro, and Palawan, while the township act was applied to the settlements of these provinces and to those of non-Christians in Isabela, Abra, Pangasinan, Zambales, Tarlac, Bataan, Sorsogon, Antique, Eastern Negros, and Misamis.

Many changes in these acts were necessitated by experience, and they were ultimately carefully revised with a view to combining them so that there should be one provincial act and one township act for the government of non-Christian tribes throughout the archipelago outside the Moro Province. This arrangement proved feasible, and on September 14, 1905, the special provincial-government act and the township-government act were adopted. The former applies to the provinces of Benguet, Nueva Vizcaya, Mindoro, Palawan, and Lepanto-Bontoc, the latter to all townships and settlements of non-Christian tribes except those of the Moro Province. The fundamental principle on which both of these acts is based is that the non-Christians are not to be subjected to the municipal officials of Christianized towns, at whose hands they have in the past suffered so much oppression and whom they cordially hate, but are to be taught to govern their own settlements, such intervention as is necessary in their local affairs being exercised directly by the provincial authorities, who, in the case of the 5 provinces above mentioned, are appointed by the governor-general.

The township-government act is elastic in the extreme. In the case of settlements (rancherias) of the least civilized tribes the provincial governor, with the approval of the provincial board, names the local officers and determines their powers and duties, the invariable plan being to select men who already have influence in the several settlements and to persuade them to exercise their power in a

proper manner and at the same time to influence the people to submit to their authority when so exercised. The taxes, if any, that the people of such settlements are to pay are determined by the provincial board, and all moneys received from taxation must be expended for local purposes.

When the people of any settlement have progressed sufficiently, they may, by resolution of the provincial board, be brought under a simple form of local self-government, in which all of their officers, except their secretary-treasurer, are elected by manhood suffrage. Funds for the support of such governments are raised by a very low property tax and must be expended for local purposes in the settlements where they are raised. The appointment of the secretary-treasurer is left in the hands of the treasurer of the province, subject to the approval of the provincial board, for the reason that the incumbent of this office must be honest, must be able to read and write, and must understand the local dialect as well as Spanish or English. This ordinarily means that he must be a Christian native. It is most important that he should be on good terms with the people, and for these reasons he must be selected with great care. As the non-Christians frequently have little acquaintance with the Christian natives, it would be quite impossible for them to select a suitable candidate for this position.

There are other provisions by which portions of the municipal code, or the code in its entirety, may be applied to settlements of non-Christians as they advance in civilization.

As the opening up of trails affording ready communication is a matter of vital importance in the wilder provinces, and as the people themselves have shown appreciation of the advantages resulting from the construction of trails and are willing to work upon them, a road tax of 2 pesos per year is imposed upon each male inhabitant between the ages of 18 and 55 in the provinces organized under the special provincial government act. Anyone not desiring to pay it may work it out. The provincial board has, however, authority to exempt the people of any settlement from the payment of the road tax when in its opinion such course is desirable.

The provincial board may also impose on the people of any settlement a cedula tax of 1 peso per year, which is collected and disbursed in the same way as other internal-revenue taxes.

As a means of protecting the people against possible abuse of power, all important powers of the governor and provincial board are exercised subject to the approval of the secretary of the interior. As a further means to this end, the settlement officers of each of the provinces above mentioned and of the subprovince of Abra are authorized at their annual meetings to elect a popular representative, whose journey to Manila must be facilitated by all government officials, should he desire to go there, and he is in all cases, except treason, felony, and breach of the peace, privileged from arrest at any time when arrest will interfere with the discharge of his duties, and for any communication or statement which he may make to the chief executive he can not be held to account by any officer, whether civil or military.

Through the popular representative knowledge of any abuses committed is reasonably sure to reach Manila. It is, however, true that many non-Christian peoples are timid in the extreme, and that they

have in the past suffered so at the hands of the Christian natives and of Spanish provincial officials that they hesitate to make complaints, so that the truth can be ascertained only by persons actually on the ground, who must secure the confidence of the people before the latter will talk freely.

As a further check upon the somewhat arbitrary powers necessarily conferred upon provincial officials in dealing with the more primitive tribes, it has now been made the duty of the secretary of the interior to visit and inspect each of the 5 provinces organized under the special provincial government act at least once each year. In point of fact, such trips, although not prescribed by law, had previously been made.

During January and February of the present year I went to Vigan by steamer, ascended the Abra River on a raft to Bangued, and in company with Governor Blas Villamor, of Abra, and Supervisor Kane, of Lepanto-Bontoc, visited numerous Tinguiane settlements of Abra, and ultimately crossed the great Cordillera Central at a point where the crest of the range was 6,500 feet above sea level. We then descended to the little known Saltan River, in the extreme north of the province of Bontoc, and visited the Tinguiane settlements in its valley, continuing our journey to the Kalinga settlement of Salecsec, where a long conference was held with the local chiefs and with the celebrated Atumpa, chief of Guinaan (Guinaang), who is the great statesman of the wild tribes of northern Luzon.

Thereafter we made our way over Dead Man's Mountain to the Kalinga settlements of the Nabuagan River valley, which had not previously been visited by any white man. We then descended this river, which reaches civilization at Tuao, in the province of Cagayan, and not at Malaueg, as the maps indicate. The stream which comes out at Malaueg has no connection whatever with the Nabuagan River. The trip from Bangued to Balbalasan was made on horseback and on foot. That from Balbalasan to Tuao was made on foot or by bamboo raft.

From Tuao we went on horseback to Tuguegarao, the capital of Cagayan; thence by river steamer to Ilagan, the capital of the province of Isabela; and from Ilagan, in company with Governor George Curry, to Cauayan by launch and to Masay-saya-saya on horseback; and from this point by native boat on the Rio Grande, the upper part of which is very incorrectly mapped, to Dumabato, an Ilongote settlement, where the American outlaw Sibley long had his headquarters.

The Ilongotes are a head-hunting tribe of very low civilization, and have intermarried freely with the neighboring Negritos. At Dumabato a conference was held with Ilongote and Negrito chiefs; and we then returned to Echague in a native canoe, and made our way on horseback to Bayombong, the capital of Nueva Vizcaya, subsequently proceeding to the Ifugao settlements of Quiangan and Banaue, crossing the Polis mountain range at an elevation of 6,200 feet, and descending to Ambuan, in Bontoc, whence we proceeded to the settlement of Bontoc, the capital of the subprovince of the same name, and to Cervantes. The west coast was finally reached by the way of Angaqui and the Tilad Pass.

This trip occupied seven weeks. Our escort consisted of one Ilocano constabulary soldier, who cooked for us, and one Ilocano municipal policeman from Bangued, who stayed with our baggage. Although armed only with 6-shooters, we penetrated the territory of the tribes of northern Luzon, which are popularly considered most warlike and dangerous, were able to establish friendly relations with all the persons whom we met, and were not at any time seriously molested.

From personal observation of the governments established in Benguet, Amburayan, and Lepanto for the more civilized Igorrotes I can say that they have been a decided success.

Head hunting has been almost completely suppressed in Bontoc and in that portion of Nueva Vizcaya inhabited by Ifugaos. In both of these regions the people are now most kindly disposed toward Americans, and the men instead of remaining constantly under arms as heretofore are able to till their fields and to extend their wonderful system of irrigated rice terraces, which affords one of the most astonishing examples of primitive engineering to be found anywhere in the world.

The Ilongotes of Nueva Vizcaya have not been brought under control and still organize head-hunting expeditions against their civilized neighbors.

The Tinguianes of Abra are on the whole prosperous and contented, although the zeal of the former officials of that province to promptly civilize them upon paper has created some conditions which need to be remedied and which will be remedied promptly now that a law has been enacted giving the Secretary of the Interior the necessary power of intervention.

In Mindoro Governor Offley has won the regard of the Mangayans by protecting them from the rapacity and oppression of the Tagalogs of the coast towns, and people who a few years since would have given up their lives rather than be taken to the capital now in some instances come 80 miles on foot through the forest to lay their troubles before him.

Trade schools have been established for the Igorots of Benguet, the Igorots of Bontoc, and the Ifugaos of Quiangan. Their children are rapidly learning English, and before many years it will be possible to dispense with the Ilocano secretary-treasurer now necessary in their settlements.

There is still a tendency on the part of the Christian natives of certain localities to purchase young children from the wild people and bring them up in what amounts to a state of slavery. A number of cases of this sort have been brought to the attention of this office. When attempts were made to prosecute those engaged in this practice, the curious fact was revealed that there did not exist in the Spanish law still in force in these islands any specific provision against the sale or purchase of human beings. Slavery had long since been explicitly prohibited in the Moro Province by Act No. 1078, and the subject is fully covered in other islands in the criminal code about to be enacted. Meanwhile it is believed that the cases at present known can be satisfactorily dealt with under the provisions of Spanish law relative to kidnaping and illegal detention.

WORK OF THE COMING YEAR.

During the coming year work among the non-Christian tribes will be pushed as rapidly as possible. Trails are now approaching Balbalasan in the Saltan River Valley from three different directions, and this place will soon become a strategic point from which we may work to the northward into the almost unknown mountains of the Cordillera Central. It is my purpose soon to attempt to make a trip from Laoag, the capital of North Ilocos, to Abulug or Pamplona, in Cagayan, through the unknown territory of the tribe commonly known as Apayaos, in order to establish friendly relations with them, with a view to the early suppression of head hunting in this region.

SALE OF CLOTHING TO NONCHRISTIANS RECOMMENDED.

In the high mountain regions of northern Luzon I have found an unbelievable amount of suffering from cold among the practically naked inhabitants. I strongly recommend to the Commission that constabulary officers at Bontoc, Labuagan, Banaue, and Balbalasan be allowed to sell to the wild people at actual cost blue army shirts, blankets, and cloth from which the women may make skirts. It is useless to pay these people for work upon the trails when there is no possible way for them to spend the money thus earned. An army shirt constitutes a full suit of clothes for a wild man, and when obtained becomes his most valued possession. A blanket is highly appreciated, and a hat satisfies lifelong aspirations.

The sale of these articles would create good feeling, relieve suffering, and afford an inducement to labor in order that money might be earned for their price.

Very respectfully,

DEAN C. WORCESTER,
Secretary of the Interior.

The PHILIPPINE COMMISSION,
Manila, P. I.

APPENDIX A.

REPORT OF THE COMMISSIONER OF PUBLIC HEALTH, SEPTEMBER 1, 1904, TO AUGUST 31, 1905.

DEPARTMENT OF THE INTERIOR,
BUREAU OF PUBLIC HEALTH,
Manila, P. I., September 14, 1905.

SIR: In accordance with act No. 157 I have the honor to submit herewith a report of the operations of the board of health for the Philippine Islands for the year ending August 31, 1905. My predecessor, Maj. E. C. Carter, Medical Department, U. S. Army, prepared the report up to and including March 31, 1905. Major Carter retired as commissioner of public health April 27, of this year. In his report he covered all the general subjects for the year, and only the principal events from that period to the end of the year will be briefly summarized by the undersigned. In order to avoid confusion statistical tables for the entire fiscal year have been substituted for the individual tables which covered the periods of service of the two commissioners of public health who have acted during the year.

CHOLERA.

After an absence of this disease since April 18, 1904, it again made its appearance in August, 1905. From time to time during the year, but more particularly during the early part of August, deaths were reported from various parts of the city and from the provinces, the clinical symptoms of which had been those of Asiatic cholera. A careful bacteriological examination was made of each case by the bureau of government laboratories, but no cholera organisms could be found. Some of the cases were strongly suggestive of meat poisoning, and investigations are still being conducted by Dr. Richard P. Strong to determine whether the organisms peculiar to meat poison, notably the bacillus proteus, could not be isolated. The same precautions were taken, however, as if the cases had been cholera and included, among other things, the disinfection of the premises in which they occurred.

On August 23, while Passed Assist. Surg. John D. Long, of the Public Health and Marine-Hospital Service, was performing autopsies at Bilibid Prison, he encountered one case, in the person of a prisoner of that institution, which presented the gross pathological lesions usually found in cholera, and specimens were immediately sent to the laboratory for examination, and the morning of August 25 Dr. Richard P. Strong, the director of the Biological Laboratory, reported that the spirilla of Koch had been found in the specimen submitted, the first laboratory confirmation of the presence of the disease.

Simultaneous with the appearance of the disease in Manila suspicious cases of cholera were reported from Fort William McKinley, the diagnosis of which was subsequently confirmed. On August 27 information was received that the disease had also made its appearance some time prior to August 20 at Jala Jala, Rizal Province, and subsequently additional reports were received which strongly indicated that the disease had been present at about the same time at Pateros, Pasig, Taguig, and Muntinlupa, all of which are places situated either on the upper Pasig or ports on Lake Laguna. Owing to the fact that the disease was reported to be present at Hongkong, it was first thought that it might have been imported by vegetables; but subsequent investigation showed that the entrance of green vegetables from China had been prohibited since February, 1905, and that only potatoes, onions, and garlic were admitted, and none of these products had entered the Philippines since June, 1905. The present indications are, also, that the disease made its appearance in Rizal

Province before any cases were detected in Manila, and the general opinion is that some old center of infection again became active. This view seems plausible when it is remembered that the last case of the previous epidemic was reported from Malahi, Laguna, and that some of the first cases this time were reported from Jala Jala, Rizal, which is a distance of not more than 7 miles from Malahi. The belief is rapidly gaining ground among medical men that the disease is indigenous to the Philippines.

Active measures for combating the disease were at once instituted. Owing to the dissatisfaction and great opposition, which was caused by the land quarantine which was placed around the infected districts in the epidemic of 1902, and the futility of the undertaking, it was thought advisable to attempt to combat the disease by a campaign of education, the object of which was to attain the prompt reporting of the cases, the isolation of the sick, and the disinfection of the infected premises. To this end, the cooperation of the bureau of education and the different religious denominations was obtained. Over 150,000 circulars, containing 16 simple rules with regard to the spread of cholera, have been distributed throughout the islands, and their contents are being made known to the inhabitants of every city, pueblo, and barrio.

With the exception of the instances already mentioned, the disease has been so far confined to Manila. The spread of cholera in the city this time has been entirely different from that of 1902. At that time the disease commenced in the Farola district, and from there spread to other portions of the city and then gradually throughout the islands. This time sporadic cases have been reported from almost every section of the city, but no subsequent case has been detected in any house which so far has been reported as infected. The earlier cases were of the most virulent type, and nearly all were of the cholera sicca form of the disease, the victims dying within a few hours after being attacked.

In view of the fact that the disease has only existed during the last week of the year covered by this report, it is impossible to give much exact data with regard to the outbreak. In Manila there were 45 cases between the 23d and 31st of August, inclusive, of which 41 died. Ten was the largest number that occurred on any one day. In the provinces there were 56 cases with 48 deaths.

TREATMENT OF LEPROSY.

Especial attention is invited to that portion of the report of Dr. H. B. Wilkinson, physician in charge of the San Lazaro hospitals, in which the treatment of leprosy by the X-ray is discussed. Two cases of leprosy, the diagnosis of which had been confirmed microscopically by the physician in charge of the San Lázaro hospitals, and independently by the bureau of government laboratories, were treated by the X-ray for a period of some months, at the end of which time they were again examined by the same observers, but no lepra bacilli could be found. The infiltrations into the tissues and other symptoms of the disease have disappeared almost entirely. Sufficient time has not yet elapsed to arrive at any definite conclusion with regard to the permanency of the apparent cures, and it is not deemed advisable to discuss the matter further until the cases have been under observation for a greater length of time. However, if this treatment should prove successful, its far-reaching consequences can scarcely be appreciated as yet.

INSANE.

The question of providing for the insane is becoming more pressing all the time, and the present accommodations are entirely inadequate to meet the demands. The construction of a large modern insane hospital should receive early consideration.

TYPHOID FEVER.

During the past few months so many cases of typhoid fever have been reported that it was deemed advisable to make a special investigation, in order to ascertain whether the disease is actually present to the extent which the reports indicated. During June some 60 cases were reported from the Ermita and Malate districts. Accordingly, from every case reported for the six weeks commencing July 1, a specimen of blood was obtained and sent to the laboratory for the purpose of having a Widal reaction made. That the early reports were erroneous appears probable, because only four cases could be found in which the diagnosis was confirmed.

DYSENTERY.

Dysentery still remains the most serious and common disease to which the white man is subjected by residence in the Philippines. With a view to ascertaining whether this disease is not at times contracted in public places, samples of water were collected June 22, from hotels, clubs, government offices, schools, police stations, bottling works, and restaurants, a total of 61 being secured. Of this number 17 were found to contain amoebæ. Among other places so infected was the storage tank of one of the establishments at which the water is distilled. Measures were at once taken to correct this condition of affairs, and subsequent examinations have shown a marked improvement.

CAVITE PROVINCE.

Probably one of the most satisfactory results accomplished by the board of health during the year was the eradication of smallpox from that province. The disease has been present there for a great many years, and has been one of the most prolific sources from which smallpox cases in Manila were recruited.

BUBONIC PLAGUE.

From the statistical tables it will be observed that the number of cases of plague has been about one-half of that reported for the previous year. This decline in the number of cases is in all probability due to the great improvement which has been brought about in the sanitary condition of the houses.

MEDICAL EDUCATION.

The question of medical education is one which directly concerns the insular board of health, not only on account of the intimate relation of medicine to sanitation, but also because in act No. 310, regulating the practice of medicine and surgery in the Philippine Islands, the Commission has constituted the aforesaid organization the sole judge of the reputableness of medical schools so far as their recognition by the board of medical examiners for the Philippine Islands is concerned.

The scarcity of native physicians in the Provinces has been a source of embarrassment and hindrance to the health authorities in their work, hence the commissioner of public health, as an officer of the government, in his official capacity and as the president of the Philippine Islands Medical Association, has interested himself in the matter of the organization of a modern school of medicine in Manila with postgraduate facilities and research laboratories. The preliminary plan of organization has been worked out and the necessary recommendations and estimates submitted to the legislative body.

The legal aspect of the preliminary organization may be seen from the following bill:

"AN ACT Incorporating the medical school of the Philippines and defining the manner in which it shall be controlled and conducted.

"*By authority of the United States, be it enacted by the Philippine Commission, that—*

"SECTION 1. There is hereby created under the general provisions of the 'Corporation Law' a public corporation to be known as 'The Medical School of the Philippines,' for the purpose of giving medical instruction to qualified students, under such conditions as shall be fixed by a board of control upon the recommendation of its faculty.

"SEC. 2. Until such time as a government university shall be established the governing power of the corporation shall be vested in a body to be known as 'The Board of Control of the Medical School of the Philippines,' which shall consist of the secretary of the interior, the secretary of public instruction, and one other member of the Philippine Commission, to be designated by the governor-general of the Philippine Islands, and the dean of the faculty.

"SEC. 3. The board of control shall have the following powers:

"(*a*) To receive endowments and bequests and to provide for their investment and disbursement according to the conditions of donor or legatee.

"(*b*) To receive and appropriate for the ends specified by law such sums as may be provided for the support of the school by legislation of the Philippine Commission.

"(*c*) To nominate to the governor-general, for appointment, the faculty of the school and fix the duties and responsibilities of its members, who shall make regulations with reference to courses of instruction, admission of students, standards for graduation, discipline, and the internal management of the institution.

"(*d*) To confer the degree of doctor of medicine upon such persons as are recommended by the faculty.

"(*e*) To make to the Commission recommendations in regard to the condition of the school and to present estimates for appropriation necessary for its maintenance.

"SEC. 4. The faculty shall have the following powers:

"(*a*) To recommend to the board of control, for nomination to the governor-general of the Philippine Islands, the establishment of and appointment to all professorships to be created or filled subsequent to the appointment of the original faculty.

"(*b*) To establish instructorships, lectureships, and other tutorial positions, and to fill such positions by appointment or engagement.

"(*c*) To make recommendations to the board of control on matters pertaining to the conduct and management of the school; to present an annual report on the work of the school for the year ending June 30 of each year, and to present to the board of control estimates for appropriation necessary for the maintenance of the school.

"(*d*) To elect a dean who shall represent the faculty of the school and shall be its executive head, and to elect a secretary who shall hold office for three years.

"SEC. 5. All disbursements set aside by the board of control for the conduct of the school shall be approved by the dean and shall be audited by the insular auditor and disbursed and accounted for in the same manner as other government funds. The disbursements of the school shall be made by a public disbursing officer to be designated by the governor-general of the Philippine Islands.

"SEC. 6. Upon request of the board of control, heads of bureaus and offices of the insular government are authorized to furnish apparatus and supplies as may be required, and to detail employees for duty in the medical school, and employees so designated shall perform these services, and the time so employed shall count as part of their prescribed service to the government.

"SEC. 7. The public good requiring the speedy enactment of this bill, the passage of the same is hereby expedited in accordance with section two of 'An act prescribing the order of procedure by the Commission in the enactment of laws,' passed September twenty-sixth, nineteen hundred.

"SEC. 8. This act shall take effect on its passage.

"Enacted ———— ——."

NEW LEGISLATION.

The following proposed acts have been prepared and forwarded to the Commission for consideration, since April 1, 1905:

"An act abolishing provincial boards of health, and substituting therefor district health officers, and repealing act numbered three hundred and seven, entitled 'An act providing for the establishment of provincial boards of health and fixing their powers and duties,' and providing that all the duties heretofore performed by presidents of provincial boards of health and by provincial boards of health shall devolve upon district health officers."

"An act regulating the establishment and maintenance of burial grounds and cemeteries, and governing public funerals and the disposal of the dead in the Philippine Islands, outside the city of Manila."

The proposed sanitary code for the city of Manila was returned to the board of health for reconsideration. This work is now in progress.

The following acts which affect the board of health were passed during the year: Nos. 1225, 1248, 1340, 1342, and 1361. The above were all appropriation acts, with the exception of act No. 1340, which imposed additional duties upon the board of health, and is entitled:

"An act authorizing the board of health for the Philippine Islands to promulgate quarantine regulations for the government of vessels engaged in the coastwise trade of the Philippine Islands."

THE MANILA WATER SUPPLY.

It is of course known to the undersigned that steps have been taken to collect the water for the city of Manila some time in the future from an uninhabited watershed located farther up the Mariquina Valley, but the experience with the cholera of the past few weeks has again forcibly recalled to our minds the grave menace that continually confronts the city of Manila. If the dejecta of one cholera patient should be deposited in the stream near the present intake of the city water supply, it would probably mean that hundreds and perhaps thousands of lives might be sacrificed. Another danger, equally important, is the fact that an epidemic of typhoid fever may ensue as the result of the present condition of affairs. This latter disease is now rare

in the Philippines, and every effort should be made to prevent it gaining a firm foothold.

In view of the foregoing and the many other water-borne diseases that may be contracted, it is strongly urged that the contemplated removal of the watershed be vigorously pushed and completed at the earliest possible moment.

THE TREATMENT OF WATER SUPPLIES BY COPPER SULPHATE.

Since the publication of Bulletin No. 64 by the U. S. Department of Agriculture, Bureau of Plant Industry, of "A Method of Destroying or Preventing the Growth of Algæ and Certain Pathogenic Bacteria in Water Supplies," by George T. Moore, Physiologist and Algologist in Charge of Laboratory of Plant Physiology, and Karl F. Kellerman, Assistant in Physiology, the subject has attracted much attention, especially in the medical journals. In view of the favorable reports that were made, and the importance of the matter to the city of Manila, it was decided to test the method upon the local water supply.

A sufficient amount of copper sulphate was added to the water at El Depósito to make a solution of one to four million of the entire city supply. This experiment was carried on for a period of eight weeks. Samples of water were taken once a week at three different sections of the city and were regularly examined at the bureau of government laboratories.

The results, so far as amœbæ were concerned, were not at all encouraging. Amœbæ were found in the water before copper sulphate was introduced, and in all the water which was examined subsequently they were found present every time, with one exception, and in that instance the amœbæ were present in two out of the three samples that were taken on the same day. In the laboratory the experiment was carried still further by making a solution of copper sulphate one to one hundred thousand, and after a period of three days amœbæ were found in the water, apparently just as numerous as in the control. Thus it will be seen that whatever other value copper sulphate may possess, it is practically of no service in the destruction of amœbæ. There seems, however, to have been a reduction in the number of bacteria. At the beginning of the experiment samples of water taken at three different sections of the city showed 240, 150, and 180 bacteria per cubic centimeter, respectively, while toward the close of the experiment the figures were 120, 60, and 65, respectively. In other words, of the 27 bacteriological examinations made subsequent to the first one, in 21 the bacteria were found to number less than 100 per cubic centimeter, and in the remaining 6 they never reached above 140. By contrasting this latter number with the 240 originally found, it will be seen that a marked reduction has taken place.

Very respectfully,

VICTOR G. HEISER,
Passed Assistant Surgeon, United States Public Health and Marine-Hospital Service, Commissioner of Public Health.

To the SECRETARY OF THE INTERIOR,
Manila, P. I.

REPORT OF THE COMMISSIONER OF PUBLIC HEALTH, SEPTEMBER 1, 1904, TO MARCH 31, 1905.

DEPARTMENT OF THE INTERIOR,
BOARD OF HEALTH FOR THE PHILIPPINE ISLANDS,
OFFICE OF THE COMMISSIONER,
Manila, P. I., April 29, 1905.

SIR: I have the honor to submit a report of the board of health for the Philippine Islands and the city of Manila for the period of seven months beginning September 1, 1904, and ending March 31, 1905, the latest possible date to which the statistics could be conveniently carried and be ready for inspection before my departure. The work of the remaining five months will be included in the regular annual report, which will be submitted at the required time by my successor.

With the rendition of this final report my official duties as commissioner of public health for the Philippine Islands cease. The record of my services is written and must stand without change. The three years during which I have held the office of commissioner of public health have been critical ones in the history of American occupation, but I believe that I can truly say that the organization over which I have had the honor to preside emerges from the trying conditions of this period with the power and strength of increased knowledge and usefulness.

There have been trials, tragic and ludicrous; disappointments, keen and humiliating, and failures, complete and heartbreaking. These have not been without their valuable lessons.

If the scientific aspect alone of the work and purposes was to be considered, justice could not be done to the devoted men who have given of their best—and an excellent best it was—to sustain the health authorities in their endeavors to meet emergencies and to pursue the golden mean, albeit a compromise, between the right and the expedient. It is not to be denied that this so-called mean has been nearer to the expedient than to the scientific right, and that which has been accomplished has been brought about along the lines of least resistance rather than along the lines of scientific accuracy, for it has been demonstrated here, as elsewhere, that state medicine or prophylactic sanitation must be largely influenced by the habits, the customs, the attributes, and by all that goes to constitute the genius of the people whose condition it is desired to improve, and a campaign which is aimed at the extinction of an epidemic or at the betterment of insanitary local conditions is doomed to failure if it does not take into consideration the susceptibilities as well as the needs of the population.

Now, a knowledge of the sentiments of a strange people, which underlie the susceptibilities, may not be obtained from books, or indeed by observation alone, and through lack of that knowledge I have sometimes found myself in perplexing situations, out of which the best method of escape was difficult to determine.

An effort has always been made to secure the cooperation of the medical faculty of these islands in any measure that seemed radical, and if success has not always crowned the effort, may it not be due to the lack of persuasiveness of the sanitary authorities, as well as to other causes? Time alone can give an answer to this question.

It was, of course, the purpose of the board of health to arrange a plan of action—clear, definite, and logical; to lay out its line of operation, and to follow as near to that line as possible. Then by experience, it was hoped, would be found a simple and comprehensive method whereby public good could be accomplished, little friction produced, and the people themselves gradually persuaded, led, and finally attracted toward the good. Moreover, if the history of the Teutonic people, and of the Latins too, teaches anything, it teaches that laws and the systems of life are a growth and a development, and do not spring, admirable and complete, from the brain of some genius as Athene sprang from the forehead of Zeus.

Perhaps one of the most perfect types of sanitation the world has ever seen was the Romam camp, with its walls, its moats, its orders, its drainage, its latrines, and its perfect cleanliness.

The effect of epidemics and of violation of sanitary laws, the laws of nature, not of man, but which must be understood and interpreted by man, have been more disastrous upon nations and peoples than wars or any other calamity.

The plague in Athens destroyed Greek culture and civilization as much as did the Peloponnesian war, or the loss of the Athenian fleet before Syracuse.

The insanitary condition of the Roman Campania broke the power of Rome as much as did the Goths and Huns. The pernicious malarial fevers and dysenteries, due indirectly and directly to the choked canals and undrained lands in Mesopotamia, have converted the most fertile region of the world into a wilderness, the glorious gardens into squalor, the vigorous inhabitants into filthy nomads, Babylon into a cesspool.

Is it not true that a nation's worth may be gauged by its sanitation; that a people's efficiency may be measured by its life hygiene; its doom be predicted from its dirt, and its destruction presaged from its filthiness? History proves it by methods as clear, logical, and convincing as those employed in geometry, and science demonstrates it with mathematical precision. But science does more than that, it explains why the fact is as it is, and better still it points out a way to remedy the evil. Much is known now in regard to sanitation not dreamed of twenty-five years ago, and ten years hence much more will be known.

History warns the nations that science may save them, but for those who are deaf alike to the warnings of history and to the teachings of science it may be said:

"Their doom is upon them;
They that are filthy,
Let them be filthy still."

Their decadence may be slow—it is certain; their worth may gradually decrease—it will vanish; their effectiveness disappears; the long night of obscurity falls upon them; their glory is departed; they are dead.

With a full consciousness of the facts and of all they mean for the future of these people, can it be wondered at that the health authorities have been at times overzealous, overstrenuous? It is not true that men were ever pursued on the streets of Manila and captured, vanquished, and vaccinated; but it is true that the strong arm of law is ever behind the bureau of health to give it the necessary aid.

FORMER BOARDS OF HEALTH.

A board of health existed in Manila under the Spanish régime and gave council to the government. Members of the board went to places infected with epidemic diseases, studied their etiology, prescribed rules and regulations, rendered reports, etc.

A board of health was established by the military authorities, and the sanitary orders of the provost-marshal are about the best health regulations known to the writer. They are comprehensive, clear, practical, and definite. In the period of reaction against militarism many of these orders have been changed, not usually bettered. It is hoped that these will be rechanged, so as to swing back to the original position, with the additional force which will have been added by a phraseology somewhat better suited to the legal point of view. But on the whole the writer believes, after an experience of three years, that the sanitary orders of the provost-marshal constitute the best working formulæ for health legislation with which he is acquainted. Their weakness is not in their sanitary but in their legal aspect.

ORGANIZATION.

The bureau of health is subdivided into eleven divisions:

1. Division of inspection, disinfection, and transportation, under the charge of the chief health inspector.
2. Disbursing division, under the charge of the disbursing officer.
3. Division of statistics and reports, under the charge of the secretary of the board of health.
4. Sanitary engineering division, under the charge of the sanitary engineer.
5. Clerical division, in charge of the chief clerk.
6. Property division, in charge of the property clerk.
7. Vaccination division, under the officer in charge, who is at present the chief health inspector.
8. The division of hospitals, under the supervision of the chief health inspector, but directly under the physicians in charge of the respective hospitals.

9. The leper colony division, under the charge of the director.
10. Veterinary division, under the charge of the chief veterinarian.
11. The provincial health division, under the direct charge of the commissioner of public health.

Division chiefs deal directly with the commissioner of public health. All records, except hospital records, are kept in the record office of the clerical division.

Papers pertaining to these divisions pass directly from the chief clerk to the head of the proper division, who lays them before the commissioner of public health, with his comments.

DIVISION OF INSPECTIONS, DISINFECTIONS, AND TRANSPORTATION.

This division is under the charge of Dr. Thomas R. Marshall, and is one of the most important of the divisions into which the bureau of health is subdivided.

Not only has the city of Manila been divided into health districts, but the Philippine Islands have also been similarly divided, and as each division of the city has its medical inspector, sanitary inspector, and assistant sanitary inspectors and sanitary police, so the health districts of the islands have each a medical inspector assigned to inspect each district, investigate the sanitary conditions, and report upon them, and upon the efficiency of the sanitary or health organizations therein.

It is believed that these reports which are appended hereto, and the similar reports of the medical inspectors which are to be found in the report of the bureau of health for the year ending the 31st of August, 1904, will give a fairly correct idea of the sanitary conditions prevailing in the provinces and small towns; and it is hoped that the information thus made available may be of use in considering contracts for public works in the provinces.

The general impression derived from a perusal of these provincial reports is not favorable to the continuance of the provincial sanitary arrangement now in force. It has been found advisable to have the medical inspectors perform certain duties which were originally laid upon the provincial health authorities. Medical inspectors also have been detailed to take charge of the vaccinating companies which have been sent out into five different provinces, for so much difficulty was experienced in securing satisfactory results, proper reports, and correct vouchers that it became necessary to place a man in charge of each vaccination company who was competent to do the work.

Two medical inspectors are detailed as acting presidents of provincial boards of health. These men are also in charge of the vaccination companies in their provinces.

One medical inspector is detailed at San Lázaro hospitals, and another in the Sampaloc Hospital.

The eighteen medical inspectors authorized by law are employed as follows:

Four are engaged in the inspection of the city of Manila; one is employed in connection with the Sampaloc Hospital; one is in charge of the San Lázaro hospitals; one is on duty with prisoners en route to Zamboanga; four are on inspecting tours in the provinces; two are acting presidents of provincial boards of health; five are with vaccination companies in the provinces.

It will thus be seen that twelve are engaged in work outside of the city of Manila.

DISBURSING DIVISION.

This division for some time has been under the charge of Mr. Miller Joblin, who, with two assistants, is discharging all the duties connected with it in a perfectly satisfactory manner. While vouchers and accounts are carefully viséed, no unnecessary delay ever results.

The disbursing officer at present is also cashier for the bureau of health.

During the seven months included in this report the receipts of this bureau from all sources were as follows:

[Philippine currency.]

Burial division	₱9,373.10
Veterinary division	8,173.40
San Lázaro Hospital	30.00
Sale of property	37.00
Total	17,613.50

The report of the disbursing officer and cashier, showing also the expenditures of the bureau, is appended as a part of this report.

DIVISION OF STATISTICS AND REPORTS.

This important division is under the charge of Dr. Manuel Gomez, the secretary of the board of health. Upon this division rests the responsibility for preparing the monthly reports of the bureau, the preparation and issuing of all birth, burial, and exhumation certificates, and permits in the city of Manila.

A record of marriages will also be kept by this division in the near future. Forms for this purpose are now ready for distribution.

DIVISION OF SANITARY ENGINEERING.

This division is under the charge of Mr. J. D. Fauntleroy, who was transferred to this bureau from the bureau of engineering in December, 1904. This division has charge of all the work in the city of Manila under the jurisdiction of the bureau of health, which involves matters connected with the construction, alteration, and modification of houses, buildings, latrines, cesspools, and other sanitary arrangements. It further exercises a supervision over the changes, repairs, and sanitary improvements recommended by the medical inspectors.

This division also has direct control, under the commissioner of public health, of the filling in of low ground, problems of drainage, and the approval or disapproval of building plans which are sent to it from the office of the city engineer.

In addition to the work of this nature in the city of Manila, the division of sanitary engineering is also called upon at times to investigate engineering problems at various points in the provinces. It also prepares maps and plans for any work of construction performed directly by the bureau of health, such as the construction of the leper colony at Culión.

At present this division is undermanned, and it is only by the most strenuous endeavor that its chief can keep abreast of the work devolving upon him.

The detailed work of the division is fully covered in the report of the sanitary engineer.

CLERICAL DIVISION.

Mr. Volney Eaton, the chief clerk, is in charge of this division. The work of this division is the usual work of the clerical division of any organized bureau. All records are kept and filed, and the card system is in use. It should be noted, however, that certain records pertaining to the various hospitals under the control of the bureau of health are kept at those hospitals. Attention will be called to this in its proper place.

The work of this division is onerous, as many communications come in from the provinces, all of which pass over the desk of the chief clerk. The work has been satisfactorily done, though at times the division has been somewhat crippled by lack of clerical force.

PROPERTY DIVISION.

The property division of the bureau of health is in the charge of the property clerk, who, as well as the disbursing officer, is a bonded officer. The property on hand at present is valued at somewhat over $50,000 United States currency. It is stored mainly in the storerooms in the Santa Potenciana building, but the rooms in the building formerly used as the public mint will be placed at the service of this division shortly.

The property clerk is accountable for all property. He makes the usual returns, prepares requisitions, purchases certain supplies (medicines and medical necessities) from merchants in Manila. He fills all requisitions which come in from employees of the bureau of health in the city and in the provinces, and attends to the shipping of all property. In other words, he acts as purchasing clerk, shipping clerk, and property clerk. The card system is in use in this division.

The work is properly done, and no delay is experienced in filling or preparing requisitions. As the demands for medicines and medical supplies for indigent natives come from all over the islands, the duties of this official, as shipping clerk, occupy a considerable portion of his time.

DIVISION OF VACCINATION.

The division of vaccination, which is under the charge of Dr. Thomas R. Marshall, chief health inspector, was organized during the fiscal year of 1905. Its personnel consists of 100 provincial vaccinators and 10 vaccinators for the city of Manila, including the chief vaccinator.

As smallpox is both endemic and pandemic in these islands, the necessity for a vaccination division is very great. The original plan of the board of health was to organize a corps of vaccinators of 350 individuals. That number was considered necessary in order to vaccinate the inhabitants of these islands within three years. Owing to the depleted condition of the insular treasury the Commission was not able to see its way to authorize the employment of so large a number. It therefore devolved upon the bureau of health to utilize the vaccinators authorized to the best advantage.

At first it was thought that detachments of vaccinators might be sent to those provinces in which smallpox was most prevalent. These companies were directed to report to the presidents of the provincial boards of health, who assumed charge and proceeded to vaccinate the provinces. In a short time, however, it was found that little work was accomplished under the supervision of the presidents of provincial boards of health; that frequent complaints reached the central office to the effect that vaccinators were contracting bills among the inhabitants of the provinces, and declining to pay them, and that the vouchers sent in to the central office were not so prepared that they could pass a reasonably strict scrutiny, either in the bureau of health or in the auditor's office. It was therefore decided to send out with each company of vaccinators a medical inspector and a sanitary inspector who should supervise the work and conduct of the vaccinators and scrutinize the vouchers more closely. It has been found that much more work has been accomplished by this method than by the former, and that the accounts are more reasonable, clear, and accurate. It will be seen, however, that the medical inspectors, who are paid by the central office, and who are with the vaccinating companies, are performing work properly belonging to the presidents of the provincial boards of health. In other words, the insular government is called upon to pay for work which should be paid for by the provinces. The significance of this fact will be pointed out later.

Owing to the necessity for a reduction in expenses, it was found advisable to reduce the number of provincial vaccinators on the 31st of March, 1905, from 100 to 75. This necessity has been a matter of grave concern to the health authorities, because the prevalence of smallpox is great, the mortality is high, and the resulting blindness and deformities are frequent.

Smallpox in the Philippines occupied about the same position in regard to its frequency, its mortality, and its prevalence that it did in Europe prior to the discovery of vaccination, and, as was the case in Europe, so in the Philippines, it seems to be almost a disease of childhood. The explanation of this is that all natives who have reached adult age were exposed in their childhood to smallpox, and those who did not contract it may be considered immune.

Possibly no one but the physicians brought into daily contact with the natives can realize the gravity of the smallpox situation. The good results obtained by vaccination in Manila, which will be shown by statistics, lead me to hope that equally good results may be obtained in the provinces.

From the report of the chief health inspector it will be seen that a very large number of persons in the provinces, as well as in the city of Manila, have been vaccinated. Smallpox in Manila is no longer to be feared, and not so many cases occur in proportion to its inhabitants as in the cities of Washington, Baltimore, Barcelona, and several others.

The disease seems singularly fatal to Americans, the percentage of mortality among them being at least twice what it is among the natives, but in every case where an American has contracted the disease it has been proven that vaccination had never been practiced, or at least not within many years.

A law existed during the Spanish régime making vaccination compulsory, but the chief good which resulted from that law was that the people became accustomed to its existence on the statute book and did not greatly object to it or strenuously resist its application at the hands of the Americans. In a few provinces difficulties were met. In these cases the vaccinators were at once withdrawn and the pueblos left to themselves, and within six months the contrast between the vaccinated and the unvaccinated pueblos was so marked that the chief men of the objecting municipalities requested the vaccinators to return.

The vaccine virus furnished by the serum institute has been in the main good, but great difficulty was experienced in preserving it when sent to the provinces. It was found necessary to construct special ice boxes in which the vaccine virus was placed in a small opaque receptacle. The boxes are locked and shipped by boat to the medical inspector in charge of the vaccination company, who has in his possession a duplicate key. These boxes are of such a nature that they can be transported in bancas or in carromatas throughout the provinces and the ice in them usually lasts ten days or two weeks.

As soon as the vaccine virus in one of these boxes is used up by the vaccination

company the empty box is locked and returned at the first opportunity to the central board of health. In the meantime telegraphic information is sent to the central board of health that more vaccine virus is needed and that the empty box is en route; so that there is a continuous stream of boxes with virus going out from the central office and empty boxes returning to the central office from the field. This system has been fairly efficacious, and a large percentage of "takes" has been observed, and so far no single case of any grave infection has been reported.

It was found necessary to instruct all the vaccinators in the technique of their work, and it was only after they had learned how to apply strict antisepsis that they were allowed to proceed to the provinces and vaccinate. This preparation required time, but the good results obtained by it more than compensate for the disadvantages attending it. Had circumstances been such that the number of vaccinators asked for, namely, 310, could have been authorized the work of vaccination would now be half through at least; but with the small number which the bureau of health has available, the question arises whether vaccination will not have to be practiced continuously for many years in order to immunize the 6,000,000 of inhabitants who are now in these islands, and their offspring as it arrives. I desire to call particular attention to the gravity of the situation.

It is not an unfortunate coincidence that smallpox prevails most during the dry season, at which time the transportation of the vaccinating companies is most feasible.

The records of the bureau of health show that over 213,000 persons have been vaccinated by the board of health in Manila within the past twelve months, and many more by private physicians. When we recall that Manila's population is not more than 220,000, we can understand why, in the year ending the 31st of December, 1904, there were just 27 deaths from smallpox. Ten of the 27 were Europeans or Americans who had neglected or avoided vaccination, a number out of proportion to the number of whites as compared with the number of natives, and a hopeful conclusion may be drawn from this. The law making vaccination compulsory, which existed during the Spanish régime, was reenacted by the American authorities, and as the people have become accustomed to it they have ceased to fear or distrust it. The change may be remarked from year to year, and at present the difficulty is not to get the people to be vaccinated, but to get the vaccinators. It is also not to be denied that many of the vaccinators create a difficulty of their own.

The credit for the systematic methods of this division is due to Capt. E. L. Munson, Medical Corps, U. S. Army, whose elaborate scheme is published in full in my report for last year, and to Dr. Thomas R. Marshall, chief health inspector for the Philippine Islands. The latter has had control of the system and has modified and altered it as circumstances required, so that the vaccination division of the bureau of health has developed into its most important part and has demonstrated, if demonstration were needed, that good methods are developed rather than made to order.

There have been vaccinated in the provinces during the fiscal year ending June 30, 1904, 1,007,204 persons, and in the city of Manila for the calendar year ending December 31, 1904, 213,492 persons.

The completed work done by this division may be best understood from the statistical report which is prepared by the chief health inspector and which constitutes a valuable part of this report.

DIVISION OF HOSPITALS.

The division of hospitals consists of two separate establishments:

(*a*) The San Lázaro hospitals, which consist of (1) the leper hospital for 250 patients; (2) the contagious disease hospital, which may contain from 100 to 150 patients; (3) the hospital for the insane, which will accommodate 90 to 100 patients.

(*b*) The Sampaloc Hospital.

At the San Lázaro hospitals are the morgue and crematory, which are under the control of the bureau of health.

The post-mortem tables at the morgue have been properly adjusted and a refrigerator has been built for the preservation of bodies held at the morgue.

1. Plans and estimates for the construction of a house for the physician in charge and for a nurses' home have been submitted. It is hoped their construction will be authorized, for at present the physician in charge is living in a board house with a nipa roof, consisting practically of two rooms. The nurses live in the administration building of the contagious disease hospital in the rooms that were intended for the assistant physicians and for administrative purposes. Their quarters are cramped and are not comfortable.

It seems desirable that from one to three more wards be added to the contagious disease hospital. These wards may be built for about $4,000 United States currency each. They would contain 30 or more beds, and might be used for the

scientific treatment of malarial cases, tubercular cases, and cases of other infectious or contagious disease, such as yaws, measles, tetanus, diphtheria, etc.

If the nurses' home be built there will then be room in the administration building of the contagious disease hospital for the astistant physicians who are needed at that hospital and at the insane hospital and leper hospital near by.

The house of the physician in charge of these various hospitals should be a decent structure, commodious and convenient.

2. While it is purposed to collect the lepers in these islands at various points on the island of Culión, in the province of Paragua, it must be borne in mind that the process of collection will require time, and that the leper hospitals now in use at San Lázaro and Cebú may be used as places at which lepers are to be collected prior to sending them to the colony at Culión. Therefore it is necessary to make provision for the continuance of these hospitals and the maintenance of the patients therein. Moreover it is a question of doubtful expediency to send lepers who need hospital treatment to Culión at present.

A number of repairs are needed in the leper hospital at San Lázaro; for example, the roof should be repaired at an early date, as there is risk, in my opinion, of the roofs falling in and crushing the inmates. However, the bureau of architecture will take charge of whatever repairs are deemed necessary.

While the stone walls of the building now occupied by the lepers may be disinfected with sufficient thoroughness to warrant their use as a part of the future insane asylum, certainly all woodwork, flooring, doors, beams, roofing, etc., should be removed and destroyed by fire before the building could be used for any purpose except that for which it is now used.

If the plans designed by the physician in charge can be carried out it is believed that the San Lázaro Insane Asylum may be made a creditable institution and one wherein the study of mental diseases may be carried on with profit and success.

The leper hospital at Cebú consists of two large nipa buildings and an old building of hard material. It was expected that this hospital would accommodate 300 patients, and provisions were made accordingly. The superintendent, however, has collected over 400 lepers, who are maintained on the appropriation originally designed for the smaller number. No guards are in use at Cebú, though some are necessary. The order and discipline which are maintained at the Cebú Leper Hospital reflect great credit on its superintendent, Father Filomeno Flores.

The leper hospital at Palestina was abandoned in December, 1904, and its inmates sent to the San Lázaro hospitals in Manila.

3. The women were removed from the San Lázaro hospitals, and that part of the building which they occupied was converted into an insane asylum in December, 1904. Plans for the enlargement of the insane department of the San Lázaro hospitals have been submitted along with proper estimates. These plans are on the pavilion system, and contemplate the establishment of a hospital of approximately 900 or 1,000 beds, but before this insane hospital is completed to its full capacity, in accordance with the plans above mentioned, all lepers at San Lázaro should be removed to Culión or some other place.

It is understood that arrangements are being made to remove the cattle belonging to the serum institute from the San Lázaro grounds. This is most desirable, as these grounds might then be filled in and placed in proper sanitary condition. Under the present conditions mosquitoes abound and the places occupied by the cattle are insanitary and unpleasant to sight and to smell.

The absence in the United States of the physician in charge of San Lázaro hospitals has delayed a report of the cases of leprosy in that institution, and their histories, so far as obtainable.

Microscopical examinations have confirmed the diagnoses in practically all cases, and medical and local treatment has been tried. The use of leprolin, a serum of Doctor Rost, of the British Indian service, has been begun. Doctor Rost kindly sent to the bureau of health some serum. It is the hope of the bureau to secure more, in order to give this promising method of treatment a thorough trial.

The use of the modified "Crookes's tubes" has been attended with some benefit, as several of the cases have improved markedly under the influence of the rays.

It is expected that a detailed report of the results of the various methods of treatment will be rendered at some future date by the physician in charge of the San Lázaro hospitals.

SAMPALOC HOSPITAL.

The Sampaloc Hospital for the treatment of certain diseases in women was formally opened in the residence portion of the building at No. 4 Calle Alejandro VI, corner of Calle Alix, in the district of Sampaloc, December 10, 1904, just one month from the date of the passage of a resolution by the Philippine Commission authorizing the

removal of this class of patients from the San Lázaro hospitals in order that a ward for insane patients might be established.

The text of the resolution authorizing the transfer is as follows:

"*Be it resolved*, That the commissioner of public health be, and he is hereby, authorized to establish and maintain an insane department in lieu of the women's department at the San Lázaro hospitals, Manila, all necessary expenses except compensation for services to be payable from funds appropriated for support of hospitals, plants, and stations, bureau of health, nineteen hundred and five; and to employ two attendants, Class A, in addition to the employees authorized by act No. 1225 for the San Lázaro hospitals, payment therefor to be made from the appropriation for salaries and wages, bureau of health, nineteen hundred and five; and

"*Be it further resolved*, That the women's department of the San Lázaro hospitals be removed from its present location to a building to be selected and rented for the purpose by the commissioner of public health, and equipped with the necessary kitchen, dining room and other furniture, bedding and medical and other supplies, the expense of such equipment not to exceed ₱4,000, payment therefor, for the subsistence of employees and patients, and for the rent of said building to be made from the appropriation for support of hospitals, plants, and stations, bureau of health, nineteen hundred and five; and the commissioner of public health is hereby authorized to employ the following personnel, as may be necessary for the operation of the department, at the respective monthly rates of compensation specified, with subsistence and quarters under the provisions of act No. 1010: One physician in charge, who shall be a medical inspector of the bureau of health, detailed for such duty, one trained nurse at ₱100, one cook and steward at ₱150, one matron at ₱40, one nurse at ₱40, two nurses at ₱20 each, three employees at ₱20 each, three employees at ₱15 each, payment therefor to be made from the appropriation for salaries and wages, bureau of health, nineteen hundred and five; and the committee on appropriations is hereby directed to make proper provision in the next appropriation bill confirming this action."

THE LEPER COLONY DIVISION.

As stated in a former report, it has been the intention of the Commission to establish a colony to which may be sent the lepers from various places in this archipelago. In April, 1904, steps were taken to purchase the ground and houses of the village of Culión, in the island of Culión. This, of course, involved a considerable loss of time, as the proceedings were slow and some of the property holders were averse to quick sales. The place has been purchased, however, satisfactory title secured, all old houses repaired, many new ones built, roads constructed, double fences of barbed wire placed between the village and the mainland, and the church put in habitable condition. Through the charity of a lady in New York a cross and bell were secured for the church. The buildings now completed at Culión would accommodate 600 lepers comfortably, and enough buildings might be added to practically double this number.

Difficulty was experienced in securing material, as most of it had to come from Manila, which is about twenty-eight hours distant from Culión. Ordinary communication between the two places occurs not oftener than twice a month, a cutter of the coast guard making the trip.

The original sum of money set aside by the Commission in previous years and carried through as a permanent appropriation was $50,000 United States currency. Of that over $6,000 was used in the endeavor to establish a colony at the Cogonal Grande, leaving between $43,000 and $44,000 available when the present colony was begun. On the 16th of January, 1905, it became necessary to notify the secretary of the interior by letter that not to exceed $5,000 United States currency of this appropriation would be left available on the 1st of February, 1905, and it was found that this sum was practically exhausted by the end of April. With the consent of the secretary of the interior an arrangement was made whereby a sum slightly exceeding ₱13,000 Philippine currency might be made available from the appropriation of the bureau of health for the "Suppression and extermination of diseases and pests."

The director of the Culión Leper Colony, Dr. C. F. de Mey, has been untiring in his efforts to push the construction to a successful close.

It is believed that it is advisable to separate the sexes. Scientifically speaking, the propostion is correct, but separation may lead to distress and complaint.

It is purposed to establish waterworks, kitchens, and a bakery. The nonleprous personnel will reside at a place about 2 miles distant from Culión and separated therefrom by water. One, or perhaps two, priests will reside near the colony to administer spiritual consolation.

There will also be a hospital, schools, etc.

VETERINARY DIVISION.

The veterinary division is mainly engaged at present in the prophylactic inoculation of carabaos and cattle against rinderpest.

In this division there are provided places for 15 veterinarians, one of whom is chief; 30 inoculators, at $900 United States currency per annum, and 15 inoculators, at $300 United States currency per annum. Only such of these places are filled as seem necessary.

In order to avoid excessive traveling expenses, veterinarians and inoculators have been stationed at various points in the islands, each unit consisting of one veterinarian, two inoculators of the higher and one of the lower class. Each unit is supposed to control several provinces, which form a district. The plan has not yet been in practice long enough to determine its usefulness.

Surra and glanders among horses, rinderpest and contagious septicæmia, foot and mouth diseases among cattle, have kept this division fully occupied heretofore. It is believed that the results of the work of this division are being felt; certainly there seems to be a diminution in the number of cases of both rinderpest and surra.

It is not believed, however, that surra may be eradicated until some method is devised whereby the neat cattle suffering with this disease may be destroyed. As these cattle do not seem to suffer inconvenience from this disease and are quite able, as a rule, to perform their usual work, it would be a hardship to destroy them without compensation to their owners, but to pay this compensation would be very expensive, and the state of the insular treasury at present hardly warrants it.

A set of simple and brief rules were drawn up for the guidance of the veterinarians and inoculators in their work, and are submitted with this report.

The importation of cattle from China by the government ceased about December, 1904.

At first it was necessary to proceed slowly with antirinderpost inoculations. The owners of cattle were suspicious and distrustful. Results were not altogether satisfactory, and when inoculated cattle died claims were made against the government. It is unfortunately true that a few members of the veterinary corps were not always as considerate of the sentiments and prejudices of cattle owners as they might have been.

Nevertheless success has outweighed failure, and in most parts of the islands the veterinarian and his inoculators are in demand as soon as there is any indication of an epizootic disease.

The supply of serum has not always been adequate to the demand, but generally speaking there has been little delay, except that due to diffiulty in transportation, in inoculating the herds of those persons who have requested the bureau to inoculate.

The practices of the veterinary division in the matter of protective inoculations are outlined in the following instructions for the guidance of the members of the veterinary corps of the bureau of health in the handling of epidemic surra and rinderpest:

SURRA.

1. All equines positive for surra should be killed, the carcasses protected from flies, and cremated or buried to the depth of 1 meter. Dogs should be kept from the carcasses at least twenty-four hours.

2. All equines in a corral in which surra has appeared but which are not positive for surra, should be immediately removed, by night if practicable, at least one-half mile. If the animals be removed by day (*a*) sprinkle them with 20 per cent solution of creolin or sulpho-naphthol or Jay's fluid; (*b*) cover them with a sheet or fly net; (*c*) use brushes to drive away the flies.

STABLES.

1. Stables and corrals should be on high, dry, wind-swept places.

2. Stables should be kept clean and be disinfected with 5 per cent carbolic acid, tricresol or creolin, or sulpho-naphthol. If possible the stables should be screened. Surra-infected stables, after having been cleaned and disinfected, should not be occupied for twenty days. All manure and stable refuse should be burned, buried, or removed at least one-half mile from the stables.

3. The equines removed from surra-infected stables or corrals should be isolated and kept under observation for at least twenty days from the appearance of the last case of surra. If no surra appears in twenty days it is presumed the animals are free from that disease.

4. All bovines positive for surra should be separated and kept at a distance from all other animals.

In conclusion, attention is invited to paragraph 2, General Orders No. 103, headquarters, Division of the Philippines, dated the 31st of October, 1903.

RINDERPEST.

1. Infected districts should be kept quarantined for at least thirty days after the disappearance of the last case of rinderpest. The locality is likely to be infected much longer, and no unprotected horned cattle should be taken into such locality for six months.

2. Treatment of animals in an infected heard or locality (i. e., wherein cases of rinderpest exist, or have recently existed).

(*a*) Such animals should be inoculated with serum, 50 cubic centimeters at least at a dose, and the inoculation repeated as indicated.

(*b*) These animals should be again inoculated about two or three months after the serum inoculation, but this time by the simultaneous method.

(*c*) No animals which are in a noticeably pregnant condition should in any circumstance be inoculated by the simultaneous method.

NONINFECTED HERDS AND DISTRICTS.

Practice inoculation by the simultaneous method.

Preferably inoculate not over ten vigorous head at the start and be guided by the results. If these are favorable, simultaneous inoculation may be more largely practiced, but careful observation of the results must be continuously made and the inoculation guided thereby; but if unfavorable the herd is probably infected, and serum inoculation alone must be practiced.

DESTRUCTION OF DISEASED ANIMALS.

In the city of Manila, under special ordinance regulation, the board of health has pursued the policy of killing and cremating all domestic animals found to be suffering from an incurable infectious disease and thoroughly disinfecting the places where they were kept. This same policy has been carried out to some extent in the provinces, but in many instances entire districts have been found in which all the animals were either infected or had been, so that this action seemed scarcely justifiable as a preventive measure. The destruction of perhaps the only animal upon which the family depends for the necessary work of the rice field, even when fully justified scientifically, is not always consistent with the promptings of mercy.

To fully or even partly indemnify the owners of all diseased animals that should, in the interest of the public health, be destroyed would involve the expenditure of too great a sum of money to be considered at this time. The question has been left to the discretion of the local authorities in the proposed legislation, recommended by the board of health in a bill entitled "An act regulating the quarantine and destruction of animals suffering from contagious or infectious diseases," as follows:

"SECTION 1. This act shall apply to all of the municipalities of the Philippine Archipelago, with the exception of Manila, which shall be governed by the provisions ofthe Sanitary Code, as provided for in act No. 1150.

"SEC. 2. It shall be unlawful for any person owning or having in charge any domestic animal suffering with glanders, farcy, surra, or other contagious, infectious, or communicable disease, knowing such animal to be diseased, to drive it or permit it to be driven upon any street, road, or other public place, or to sell or dispose of such animal.

"SEC. 3. Animals which have been in contact with an animal suffering with a dangerous infectious disease, or animals which are believed to have been exposed to the infection of such disease, shall be quarantined for such period as the commissioner of public health, upon the recommendation of the chief of the veterinary division, may prescribe; and the cost and maintenance of such animals during the period of quarantine shall be borne by the owner.

"SEC. 4. No person being the owner or in charge of any horse, mule, carabao, cattle, sheep, goat, swine, or other animals, knowing the same to have an infectious or contagious disease, shall permit such animal or animals to run at large or come in contact with other animals belonging to another person, or with other sound animals which the owner may have in his possession.

"SEC. 5. It shall be the duty of every veterinarian, physician, cirujano ministrante, or pharmacist to report, in writing or otherwise, to the nearest health officer, or to the person acting as such, every case of glanders, farcy, surra, or other contagious or infectious disease which shall come within his observation.

"SEC. 6. It shall be a misdemeanor, punishable as hereinafter provided, for any person to hide, conceal, or give knowingly false information about any animal suffering or thought to be suffering from a contagious, infectious, or communicable disease.

"SEC. 7. The bodies of animals that have died of contagious or infectious disease shall be cremated, unless otherwise authorized by the board of health or its representatives.

"SEC. 8. Any person who is the owner, or in charge of any animal that has died of a contagious, infectious, or communicable disease, shall notify the president of the municipal board of health, if there be one, or, if there be no president of a municipal board of health, he shall notify the secretary of the municipality in which such animal shall have died within twelve hours after the death of the animal, in order that proper provision may be made for the disinfection of the stable or premises.

"SEC. 9. When any stable or place is declared by a representative of the board of health to be infected with a communicable disease affecting animals, the removal therefrom of any animal, carcass, fodder, litter, utensil, or other thing, without written authority from a veterinarian of the board of health, if there be one available, or the president of the municipal board of health, or the municipal secretary, or other person authorized by the board of health for the Philippine Islands, is prohibited.

"SEC. 10. No domestic animal used for draft, food, or dairy purposes shall be kept in any place in which the water, ventilation, or food is not sufficient or wholesome for the preservation of its health and safe condition.

"SEC. 11. The board of health for the Philippine Islands shall have authority to investigate the health of domestic animals in any part of the archipelago, and it shall also have full authority to segregate and quarantine animals found to be suffering from contagious, infectious, or communicable diseases.

"SEC. 12. Whenever any animal is found to be suffering from an incurable infectious, contagious, or communicable disease, and the presence or existence of such animal shall be deemed by a veterinarian of the board of health to be injurious to the health of other animals, the commissioner of public health may direct that such animal be destroyed, and no claim shall be made against the board of health because of the destruction of such animal.

"SEC. 13. Provincial boards may authorize, within their discretion, the payment of indemnities to the owners of animals which have been killed by order of the commissioner of public health or his duly authorized representative, upon the presentation of proper descriptive certificates, showing that such animals were suffering from incurable communicable diseases, and that their continued existence would have been a menace to other animals: *Provided*, That all claims for indemnity shall be filed with the provincial board of the province in which such animals were registered, and that it shall be unlawful to pay indemnity for any unregistered animal.

"SEC. 14. Subject to the approval of the secretary of the interior, the board of health for the Philippine Islands shall have authority to make and publish such rules and regulations, not inconsistent with law, as it may deem advisable for the proper enforcement of this act, and for the suppression and extermination of contagious, infectious, and communicable diseases among animals: *Provided*, That within the jurisdiction of the Moro Province such rules and regulations shall be made, published, and enforced under the direction of the governor of the Moro Province.

"SEC. 15. Any person violating any of the provisions of this act, shall, upon conviction, be punished by a fine of not more than two hundred pesos, Philippine currency, or by imprisonment for not more than ninety days, or both, in the discretion of court.

"SEC. 16. All laws, ordinances, or parts thereof, in conflict with this act are hereby repealed.

"SEC. 17. The public good requiring the speedy enactment of this bill, the passage of same is hereby expedited in accordance with section two of 'An act prescribing the order of procedure by the Commission in the enactment of laws,' passed September twenty-sixth, nineteen hundred.

"SEC. 18. This act shall take effect on its passage.

"Enacted, ——— ——, 1905."

THE PROVINCIAL HEALTH DIVISION.

This division has been practically under the direct control and supervision of the commissioner of public health.

The system mapped out by the Commission for the sanitation of the provinces is an excellent one. It postulates, however, competent provincial and municipal health officials. It has not always been possible, or indeed, possible in

the majority of cases, to secure the proper officials, and vexation, annoyance, and failure have in many instances resulted. It is true, also, that the provincial and municipal sanitary authorities may act only in an advisory capacity, and their advice is frequently disregarded by the provincial or municipal councils. Whatever be the true causes, it seems clear, after three years' experience, that the present provincial organization is both inadequate and expensive. It is therefore recommended that the question of its abolition be seriously considered by the Commission.

In the place of the present organization the following is suggested: That the Philippine Islands be divided into sanitary or health districts. That a competent physician and surgeon (medical inspector) be put in charge of each district. This medical officer should be in the employ of the bureau of health of the insular government, paid by that bureau and subject to the orders and control of the commissioner of public health. The district should consist of several provinces, and he should be held accountable for the sanitary conditions in these provinces. He should be the adviser in all sanitary matters to the provincial councils or boards. The sanitary system of the Philippine Islands then would consist briefly of the following component parts:

1. The bureau of health, with the commissioner of public health as its executive.
2. A number of district medical officers, say 12, or more.
3. The municipal boards of health, as at present organized.

At present there are 18 medical inspectors; 1 physician in charge, San Lázaro hospitals; 1 director of the Culión Leper Colony; and 1 chief health inspector; in all, 21 physicians, not counting the commissioner of public health. At present the members of this force are distributed as follows:

In charge of Leper Colony, Culión	1
Physician in charge, San Lázaro hospitals (on leave)	1
Chief health inspector	1
Assistant to physician in charge, San Lázaro hospitals	1
In charge, Sampaloc Hospital	1
Health officer of Lepanto-Bontoc	1
Acting president, provincial board of health, Cebú	1
In charge of vaccinating companies in provinces	5
Inspecting in provinces	3
On duty in the city of Manila	5
On duty with prisoners, in provinces	1
Total	21

It will be seen, therefore, that 12 of the medical inspectors are now doing provincial work, which, with the possible exception of the care of the prisoners, should be done by the presidents of the provincial or municipal boards of health. In other words, it has been found necessary for the bureau of health to take over a considerable part (more than half) of the provincial work, in order to secure its proper accomplishment.

It is believed that five medical inspectors, or fewer, are sufficient to look after the sanitary condition of the city of Manila, so that from 10 to 12 of the present force could be counted on to do the work of district medical officers. There are also certain valuable presidents of provincial boards of health who could be added to the present force of medical inspectors taken over by the bureau of health and utilized as district medical officers.

While 12 district medical officers would suffice, and that number might be provided with little or no increase in the medical inspection force, it is considered advisable that a few of the presidents of provincial boards of health should be taken over, as some of these men are very familiar with their duties and have rendered excellent service.

At present there are 31 presidents of provincial boards of health, whose salaries amount to $37,800, United States currency. This money might be saved for the provinces. If a small proportion of the tax collected in the provinces, say not to exceed one-eighth of 1 per cent of the assessed value of the lands, could be set aside for general sanitary purposes, to be expended on the advice of the district medical officer, under the supervision of the provincial board, it might be well.

In case the recommendations herein made meet with the approval of the honorable the secretary of the interior, and of the Commission, it is suggested that the medical inspectors be designated "District medical officers," and the bureau of health be designated "Bureau of insular medical service."

Each district medical officer could, in addition to his duties as general sanitary officer of his district, perform the medical and surgical work of any district hospital which may be established.

It is believed that the plan above sketched would go far toward relieving much suffering which now exists in the provinces, and might save many valuable lives.

THE SANITARY CODE.

The board of health for the Philippine Islands, acting in its capacity as the local board of health for the city of Manila, has drafted a sanitary code in accordance with the provisions of act No. 1150 and forwarded the same to the municipal board of the city of Manila through the honorable the secretary of the interior. This proposed code is appended as a part of this report. The material embodied in the draft of the proposed code was taken from the existing city ordinances, the sanitary code of New York, and the sanitary laws and ordinances of the principal oriental cities; however, much of the matter is entirely new and original.

INSANITARY HABITS.

It is not surprising that in a country where the nature and cause of disease are so little understood by the masses, as they are in the Philippines, that there should prevail many habits and practices of an insanitary nature.

The servant class of the country contribute more than their share to these insanitary practices. The prevalence and spread of tuberculosis testify to the curse of the habit of careless spitting, which is so common among Orientals, nor are all the Americans in these islands blameless in this respect.

The ravages of tuberculosis reflect upon the application of sanitary knowledge, and until the bacteriological origin of disease becomes generally realized and appreciated, the cause of sanitation must rely upon laws and ordinances to do what ought to be done by the exercise of common sense and common decency.

The ultimate success of the teachings of the gospel of cleanliness as a prevention of disease depends more upon the public schools and good examples than upon the direct efforts of sanitary officials.

CITY SANITARY INSPECTIONS.

This branch of the work is performed in the city of Manila by the sanitary inspectors and the sanitary police, under the direction of the district medical inspectors.

The inspection service is under the general supervision of the chief health inspector, in whose report may be found the figures showing the extent of the system.

The inspectors of the board of health collect statistics of births, report to the respective health stations all cases of sickness needing the attention of municipal physicians, make a note of all sick animals for the veterinary division, and perform many other collateral duties in addition to their regular work of domiciliary inspections.

The general sanitation of the city is largely dependent upon the division of the collection and disposal of garbage and city refuse, and upon the pail conservancy system, both operated under the supervision of the city engineer.

SANITARY MAINTENANCE OF PUBLIC PLACES.

The board of health has found it necessary to recommend special ordinance regulations for the sanitary maintenance of public places, in which it is made obligatory that no hotel, lodging house, saloon, theater, school, factory, or other public place or assembly be permitted to be opened to the public until adequate and suitable privy or latrine accommodations are provided.

Next after the necessity for easily accessible exits for use in case of fire come the sanitary necessities of such places.

The habit of careless spitting is so general that it is almost impossible to make any impression upon it. It will undoubtedly require years of patient waiting before the results aimed at will begin to show.

As stated before, the hope of the future lies in the proper education of the people.

The proposed sanitary code for Manila deals at considerable length with the problems presented in this question.

INSPECTION OF FOOD AND DRINK.

By ordinance regulations, the owner, keeper, or manager of any place or premises where food or drink is manufactured, stored, kept, or offered for sale, is required to keep such place or premises and everything used therein or appurtenant thereto in a sanitary condition, and food unfit for human consumption is not permitted to be sold.

The questions of perishable foods, unwholesome animal foods, adulteration of foods and drinks, meat inspection, milk, and unwholesome waters, are fully covered in the sanitary code. The pure food committee appointed by the honorable the secretary of the interior, in their report stated that the existing legislation on the subject was ample, but that a food inspector whose duty it would be to enforce the laws, was urgently needed.

Under the present system of inspection, which has not been altogether without favorable results, it is practically impossible to enforce proper observance of the ordinances which are, however, violated as often through ignorance as through evil design.

The food inspector, when appointed, should be a specialist in this important branch of sanitation as well as a man of tact, judgment, and energy. The magnitude of the task awaiting such an official is only equaled by its importance.

It is recommended that as soon as the financial conditions will permit that the position of inspector of food and water supplies be authorized and that the inspector be empowered to impose administrative fines subject, of course, to appeals to the courts.

The board of health has caused samples of poisonous fish, rice, canned goods, special native foods, and other substances to be analyzed and has taken every precaution permitted by its limited facilities to safeguard the health of the people, but the field has scarcely been touched.

PUBLIC BATHS AND LAUNDRIES.

The poor people of Manila use the esteros and the river for laundry and bathing purposes, partly for convenience, but principally for economical reasons. This insanitary practice could be done away with very effectually by the establishment of free public laundries and free bath houses well supplied with pure water. To some this may seem to be a needless expense, but as a health measure it is of the greatest importance.

The cost of operating these institutions, when once in working order, would be insignificant, and the primary expense very little in comparison with the good that would be accomplished.

TIENDAS.

There are about fifteen hundred tiendas in Manila where food and drink are sold. These establishments are a great convenience to the people, especially to the working classes. It is very difficult, even under the most favorable circumstances, to keep these places in a sanitary condition, because the danger of food contamination is a purely theoretical proposition to the minds of the keepers, whose knowledge of such matters is as limited as their interest in the preservation of the public health. It will probably be necessary for the city authorities to require, and supply at a reasonable cost, suitable screens for articles which are exposed to contamination by the contact of flies.

The careless handling of food supplies during the cholera epidemic was undoubtedly responsible for many cases of that disease.

PLUMBING.

A plumbing ordinance for Manila has been drafted by the board of health and presented to the municipal board as a part of the sanitary code. Another important step has been the appointment of an inspector of plumbing as an auxiliary officer of the division of buildings and illumination.

Act No. 1323 authorizes the issue of $4,000,000 worth of bonds for the construction of a complete system of sewers and new waterworks for the city of Manila, in accordance with the plans of Maj. J. F. Case for the water supply, and Mr. O. L. Ingalls for the sewer system.

The proposed plumbing ordinance has been adapted principally from the plumbing law of the District of Columbia, and will eliminate many of the so-called plumbers now doing business in the city, and necessarily raise the standard in other particulars.

Since American occupation the installation of modern plumbing fixtures has become so extensive that many unqualified men have taken up the business to the detriment of sanitation and the best interests of the property holders. The board of health has insisted that all plumbing work of whatsoever character should be done in accordance with the requirements of sanitation, and by the time the new sewer system is ready for connections the plumbing ordinance will be so well understood that very little defective work will be attempted.

The sanitary engineer for the Philippine Islands is ex officio the consulting engineer of the municipal government in matters of sanitation. In this way the two offices cooperate with each other and avoid all conflict of authority.

BEAUTIFYING MANILA.

The moat around the old walls is being filled in by pumping the mud excavated by the great dredger used by the Atlantic Gulf and Pacific Company in the works of the improvement of the port of Manila. The space occupied by the insanitary and unsightly moat will be utilized in making recreation grounds. It is the purpose to reclaim all the tide lands opposite the Luneta, widen Malecon drive to 250 feet, and extend the same several miles along the bay.

According to the plans that will be recommended by Mr. D. H. Burnham, of Chicago, the renowned landscape architect, the entire space occupied by Camp Wallace will be taken up by a series of public buildings of beautiful and imposing architecture.

It is understood that Mr. Burnham, who came to the Philippine Islands at the request of the Commission, also visited Baguio, Benguet Province, Pagsanjan, Laguna Province, and several other places in the islands for the purpose of including them in his plans of municipal improvements. This great undertaking, which also includes the widening of several streets, the planting of shade trees, the establishment of public parks, even if carried out in part, will have a far-reaching effect upon public sanitation.

WIDENING THE STREETS.

In discussing the present and contemplated sanitary improvements in Manila the question of widening the streets should not be overlooked.

The municipal board has already begun the work and will carry it on as rapidly as circumstances will permit. It involves an enormous outlay of money, but in the course of time it will prove to be one of the best investments that could possibly have been made.

Sunshine and fresh air are the enemies of pestilence and disease the world over and especially so in the Tropics.

HABITATIONS.

Three classes of dwelling houses may be observed in the principal cities of these islands and two classes in the small municipalities. These different classes of structures have been appropriately called "Filipino houses," "Spanish houses," and "modern houses."

"Filipino houses" are constructed of light materials, with roofs of nipa thatch, and are cool, dry, and well ventilated, and when erected on sanitary sites and kept clean are very desirable habitations, notwithstanding their highly inflammable character, which prohibits their erection within the fire limits.

The "Spanish house" is of the type of heavy masonry, demanded by the conditions of several hundred years ago, in order to obtain security from fires, earthquakes, and the attacks of invading foes. This class of buildings is insanitary and uninviting, and supplies most of the plague cases and more than their share of the cases of pulmonary tuberculosis.

"Modern houses" are constructed of hard or mixed materials, surrounded by porches, and are light and airy. This class of houses has not yet found its way into the small municipalities where ordinances have not established fire limits to preclude the erection of the Filipino houses.

OVERCROWDING.

In my first and second annual reports this matter was discussed at considerable length and attention was called to the conditions which made the solution of the problem so difficult. While the outlook is now brighter than at any time during my

administration, it is not at all satisfactory. However important a factor the electric street-car system may be in alleviating the situation, there are other things more important, and they must come before the people can avail themselves of the advantages offered by the new transportation facilities. There must be cheap homes within easy access of the business centers. The greater part of those who live in the overcrowded districts are unable to patronize the cars.

A system of municipal tenement houses, rented at the lowest possible figure consistent with the object to be attained, seems to be the only feasible solution.

Under the prevailing tariff of exorbitant rents overcrowding cannot be regulated, nor would it be fair to the poor people to attempt to enforce the ordinances against it.

The term, "overcrowding," as used in the proposed sanitary code, means that no dwelling or other building, or part thereof, constructed of strong materials, occupied or used by human beings, shall have less than 500 cubic feet of air space for each adult found or ascertained to live, work in, or occupy the same. Two children under 10 years of age are counted as one adult. And that every closed stable, corral, pen, or premises of strong material, must contain 800 cubic feet of air space for each horse, mule, carabao, or head of cattle, and 300 feet of cubic air space for each sheep, goat, or similar animal found or ascertained to be kept or quartered therein.

Each story of every domestic house, after the passage of the code, will be required to be provided with at least one window opening directly into the external air, and the total area of such window or windows shall be at least one tenth of the floor area of such story, and each story of every such building is required also to be provided with a window of at least 10 square feet superficial area, opening into the open space in the rear of such building.

Those who live in overcrowded conditions, such as exist in many parts of the city, are to be pitied more than censured, and in all cases of administrative interference the accountability should be forced upon the offending landlords whose grasping natures find expression in many of the hardships endured by the poor.

RIVER AND HARBOR POPULATION.

About 16,000 human beings, with their retinue of fighting cocks and other domestic animals, live on board the crafts that ply the waters of Manila Bay, Pasig River, and the esteros. In these floating homes many of these people first saw the light of the world; there they live their lives, marry, rear their children, and only become land dwellers when they die and are buried in the cemeteries, and then only because of the law prohibiting the throwing of the dead into the river or harbor.

The conditions of the life which they lead present many features of interest to the sanitarian. They are usually below the average intelligence and practice many insanitary vices.

Public latrines convenient to fixed places of moorage should be erected on shore, and arrangements made to pipe the city water to accessible points, and the use of river water restricted.

OFFENSIVE AND UNWHOLESOME OCCUPATIONS.

The regulation of offensive and unwholesome occupations is, by the provisions of act 82, left with municipal councils, except in the city of Manila, where they are to be governed by the sanitary code prepared by the board of health.

Such institutions are necessary evils, but in all cases they should be operated under the most stringent regulations.

If the proposed sanitary code becomes a city ordinance, the board of health will have authority to make such regulations as may be necessary to secure, so far as possible, the sanitary maintenance of such institutions, and the city engineer will have the authority to cause the closing or removal of all such establishments as the board of health for the Philippine Islands may from time to time declare to be a nuisance dangerous to the public health.

The new sewer system will simplify this problem, as it will many other problems affecting general sanitation.

MARKETS AND SLAUGHTERHOUSES.

The municipal board has made extensive improvements in the city markets during the last year. Considering the great number of people who frequent them and the variety of merchandise sold in them and the effect of the climate upon perishable food stuffs, they are kept in a good sanitary condition.

The habits of the vendors and customers in the city markets have undergone a noticeable change for the better during the last three years.

These institutions are an important source of revenue to the municipal government, and the public welfare could not be better served than by applying the greater part of the revenue so derived to the improvement of these necessary establishments.

The city ordinances prohibit the slaughter of any four-footed animals for food or sale except in public slaughterhouses. The decision of the inspector of the board of health condemning any animal for slaughter, or any meat as unfit for food, is final, and the slaughterhouse is required to be kept at all times in an orderly and sanitary condition, and to be thoroughly cleaned at least once in the morning and once in the evening of each day. The skulls and all other discarded parts or contents of animals are removed from the slaughterhouse as soon as practicable after the animal has been slaughtered.

There is collected for each kilogram of meat, including the tongue, heart, and liver, of any animal slaughtered, a fee of 3 cents Philippine currency, and no meat is permitted to be taken from the slaughterhouse until the fees have been paid.

The following table shows the receipts, expenses, and net revenue for the several markets and the matadero for the last fiscal year, as reported by the municipal board of the city of Manila:

Name of market.	Receipts.	Expenses of collection.	Outlay for improvements.	Net revenue.
Divisoria	₱145,765.06	₱8,611.92	₱9,163.48	₱127,989.60
Quinta	66,520.21	4,047.92	5,812.61	56,659.68
Arranque	31,834.85	2,776.41	8,427.41	20,631.03
Herrán	10,006.73	798.75	2,175.35	7,032.63
Anda	3,833.64	829.77	2,018.04	985.83
Sampaloc	7,484.67	457.43	2,326.10	4,701.14
Santa Ana	1,610.08	369.26	.....	1,240.82
Tetuan	4,726.59	433.20	.....	4,293.39
Bahía	6,367.34	1,334.00	.....	5,033.34
Esteros	7,594.96	494.50	.....	7,100.46
Total	285,744.13	20,153.16	29,922.99	235,667.98
Matadero	175,645.34	9,612.79	9,724.23	156,308.32

STREET CLEANING.

This important branch of sanitation is conducted by the department of street cleaning and collection and disposal of city refuse.

In my two preceeding reports I have called attention to the very satisfactory manner in which this work is done. This service has been extended until its importance demands that it should be equipped with every modern appliance suitable for use in Manila. At present the work is carried on principally by hand labor. Street cleaning is so intimately connected with municipal sanitation that in some cities of the United States the two are classed together and called the department of health and street cleaning. The board of health for the Philippine Islands recognizes that the credit for much that has been done to secure a condition of municipal cleanliness in Manila should be given to this branch of the city government.

DESTRUCTION OF RATS.

The board of health has maintained a permanent corps of rat catchers, and during the seven months ending March 31, 1905, there were caught 113,015 rats. This work has been recently interrupted on account of the lack of funds, but it is hoped that the interruption is only temporary. This is one of the most effective prophylactic measures against plague.

Bacilli have been found in some of the rats which were sent to the bureau of government laboratories, and the consenses of opinion is that rats are important factors in the propagation and spread of the disease.

ESTEROS.

It is a part of the general plan of improvements now being worked out by the city engineer, under the direction of the municipal board, to fill in all esteros that serve no useful purpose, and to dredge and wall the others, thus making them an important feature in the scheme to beautify the city.

The esteros are of considerable commercial importance, affording employment to several thousand persons engaged in casco or other small craft transportation. The

board of health has sought to limit as much as possible their use as open sewers, and no sewage drainage, factory refuse, or other foul or offensive liquid, or other material can be lawfully thrown or discharged into them, except when the same is done under low-water mark, and in such a manner and under such conditions that no nuisance can be caused thereby. It has even been found necessary to forbid by city ordinance the storing of logs and bamboo in such a manner as to obstruct the free flow of water.

The new sewer system, when completed, will relieve the esteros of the disagreeable duties which in spite of ordinance regulations are forced upon them by the existing conditions.

COLLECTION AND DISPOSAL OF NIGHT SOIL.

On February 1, 1904, the transportation and equipment used in the collection of night soil was transferred from the insular purchasing agent to the department of engineering and public works of the city of Manila. The employees of this service, which had been under the control of the bureau of public health, were also transferred to the same department.

The night soil had been collected by means of the pail conservancy system, the odorless excavators, and private scavengers. After July 1, 1904, it was deemed best to dispense with the antiquated and insanitary methods used by private contractors and require the use of odorless excavators. On account of the cost of these excavators, which have to be imported from the United States, the private scavengers were practically forced out of business, and all the work of this character is performed under the direction of the superintendent of the street cleaning and the collection and disposal of city refuse, in the department of engineering and public works. Odorless excavators are used for removing night soil from vaults and cesspools. They consist of 500-gallon tank wagons, pumps, suction hose, and other necessary equipment especially designed and constructed for performing this work in a sanitary manner at a minimum price and without annoyance to the public.

THE PAIL CONSERVANCY SYSTEM.

The pail conservancy system has been established in many private houses, public buildings, and public closets. The system has demonstrated its utility as a sanitary measure. The special features of advantages are the nominal expense to householders for the service, the dispatch with which it can be installed, the security from plumbers' bills, and the annoyance incidental to repair work on sanitary fixtures, and its availability and adaptability.

Wooden pails generally placed in commodes are used for the reception of the night soil. After twenty-four hours clean pails are substituted and the pails which have been used are removed, tightly covered, placed on trucks, carried to the barge *Pluto* and there emptied, washed, and disinfected.

The *Pluto* was designed and constructed for this work. It is a sea-going barge of the following dimensions: Length over all, 130 feet; length between perpendiculars, 125 feet; fresh-water capacity, 40 tons, and a speed of 10 miles per hour.

The garbage hold is fitted amidships, top of hold extending 2 feet 9 inches above molded depth, and constructed of steel plates and angles capable of holding 240 tons in 16 tanks.

Many improvements have been made in the service and its scope of usefulness greatly enlarged, the credit for which is due to Mr. J. C. Mehan, the superintendent of street cleaning and the collection and disposal of city refuse, and Mr. Will L. Doud, the officer in charge of the system.

PUBLIC CLOSETS.

Upon the recommendation of the board of health several public closets have been established in the thickly populated centers, where proper facilities of this kind were needed. These closets are supplied with clean pails daily. It is recommended that each pail be inclosed in a stall provided with a door which may be fastened on the inside. There should also be more care observed in labeling the closets for women and in enforcing the observance of modesty and cleanliness.

COLLECTION AND DISPOSAL OF GARBAGE, REFUSE, AND DEAD ANIMALS.

This work is carried on by the department of street cleaning and the collection and disposal of city refuse, under the provisions of Ordinance No. 4, as amended by Ordinance No. 7, Ordinance No. 48, and Ordinance No. 56, which require the occupants

of every building, premise, or place of business, to place all garbage and rubbish in cans on the outer curb of the sidewalk, between 8.30 p. m. and 5 a. m., or to notify the superintendent of street cleaning and the collection and disposal of refuse, of any unusual quantities of rubbish or trade refuse at least twenty-four hours before removal is necessary.

All garbage is burned in the city crematories, as is also the city rubbish, except such parts of the latter as can be used for filling in lowlands.

Dead animals are also removed and cremated without expense to the owners by this service.

DISINFECTIONS.

The number of disinfecting squads was reduced by the last appropriation act to three. This number has been found practically sufficient for the present needs in the city of Manila. It has been found necessary, at times, to send some of the disinfectors to places at some distance from Manila.

There is a modern, portable steam disinfecting apparatus, which has been found of great value when bedding, or clothing, or large articles are to be disinfected.

INSPECTION OF PUBLIC SCHOOLS.

The board of health has caused to be made from time to time inspections of school buildings and of the children in attendance.

No systematic arrangement has been made for making inspections at stated periods. This is one of the questions that will devolve upon my successor.

Public vaccinators from this bureau, under the charge of a medical inspector, have visited all the schools in the city of Manila, and vaccinated the pupils in attendance.

The teaching of personal hygiene and sanitation should be a part of the curriculum of every public school. Capt. Edward L. Munson, of the Medical Corps of the United States Army, formerly assistant to the commissioner of public health, has written a book upon hygiene specially adapted to the Philippine schools. This book will be adopted by the bureau of education as a text-book for use in the public schools. Doctor Munson is the author of an exhaustive treatise on military hygiene.

It is understood that Dr. J. B. Thomas, of the civil sanatorium at Baguio, Benguet, is engaged in the preparation of an elementary special work on physiology for use in connection with Doctor Munson's book.

LOWLANDS.

Since my last report several small tracts of lowlands have been filled in. No animal or vegetable substance, or any street sweepings, dirt gathered in cleaning yards, buildings, esteros, or any other material likely to become offensive, are permitted to be used.

No order in regard to cleaning, draining, or filling in such lowlands, marshes, or stagnant water, involving an expenditure of more than 300 pesos is effective without the approval of the honorable the secretary of the interior as provided for in act No. 1150, authorizing a sanitary code for Manila.

MOSQUITO MARSHES.

The board of health has taken up the matter of destroying the larvæ of the mosquitoes.

All the known breeding places of mosquitoes are treated with petroleum for this purpose.

The report of the chief health inspector, under whose supervision the work has been done, will give special statistics with respect to this service.

The filling in of the moat should reduce the number of mosquitoes in Manila, and correspondingly reduce the chances of malarial infection.

OPIUM SMOKING ESTABLISHMENTS.

There are two hundred or more of these places where Chinese congregate to indulge in their favorite dissipation. The usual charge per man is 20 cents a pipe, which includes table space, which the victim may occupy while he is dreaming the dreams so dear to the Chinaman's heart.

These establishments are usually conducted in the back rooms of some business house. The vigilence of the police and the special care given them by the inspectors of this bureau keep them in a reasonably sanitary condition.

The number of Filipinos who have acquired the habit is relatively small.

It is probable that as long as there is a Chinaman in the Philippine Islands there will be opium smoking, because they are ingenious enough to obtain the drug regardless of whatever legislative restrictions may be placed upon it.

It should be stated that the better class of Chinese condemn the practice.

Owing to the fact that these establishments are not regulated by law, it is not practicable to force this practice out of Chinese laundries and tiendas, where recruits are taught the habit and initiated into the mysteries of the seductive drug.

It would probably be better to recognize officially the presence of the evil and regulate the same by laws and ordinances.

SAN LAZARO MORGUE AND CREMATORY.

Both of these modern institutions have been erected during my term of office, displacing the temporary establishments which were not at all suited for the purposes for which they were used.

The San Lázaro Crematory is for human remains only, the bodies of dead animals being cremated in special crematories conducted in connection with the street department of the municipal government.

Notwithstanding the erection of a new modern crematory, this sanitary and sensible way of disposing of the dead is seriously objected to by Filipinos and Chinese, probably on account of their religious beliefs.

The Japanese, the most progressive of the orientals, have recognized the scientific reasons supporting the claims of those who advocate this method of disposing of the dead, and the Japanese colony in Manila have no cemetery, its dead being cremated.

The board of health, in deference to the prevailing sentiment, has not practiced cremation to the extent that its scientific value as a means of promoting the interests of the public health has demanded, resorting to this method of disposing of bodies only in those cases in which burial was rendered inadvisable by special circumstances.

The morgue is provided with glass tables and other modern equipment for post-mortem work, and all bodies in which death has been due to infectious diseases or to unknown causes, as well as those in which the circumstances of death demand medico-legal investigation, are received into this institution and properly prepared by competent assistants for autopsies.

The statistical tables submitted by the physician in charge of San Lázaro hospitals show the number of bodies disposed of by cremation.

BURIAL OF PAUPERS.

The city makes provisions for burial by contract of the pauper dead. This privilege is very seldom if ever abused. Filipinos never permit their dead to be buried as paupers whenever it is possible for them to secure the necessary money. The bodies which are interred by the city are principally those who die in the pauper wards of the San Juan de Dios Hospital, the bodies of orphans and of the aged who die in the Hospicio de San José, the bodies of pauper lepers, and the remains of floaters found in the river and bay.

Proper respect for the remains of the dead is a part of the Filipino's religion, and unless it is absolutely necessary the last offices and attention are not intrusted to strangers.

It is recommended that the system of free burials be continued.

TRANSPORTATION.

The question of transportation is a vexed one. Transportation heretofore, in Manila and in the provinces, has been both expensive and not to be depended upon. It is hoped that the Manila tramways will solve the difficulty with which the bureau of health is at present confronted in that city. It may be years, however, before the question of transportation in the provinces is solved.

BOARD OF HEALTH LAUNCH.

For the purpose of inspecting river craft and keeping the waters free from dead animals, and for conveying vaccine supplies and other articles for shipment to boats in the bay, the board of health should be provided with a steam or electric launch, small enough to go under the bridges but strong enough for the service in the bay.

The leased launch formerly used by the board of health has been given up on account of the lack of sufficient available funds for continuing the lease.

ELECTRIC STREET CARS.

The operating of modern rapid-transit sanitary cars will no doubt prove an important factor in the health conditions of Manila. It will help to solve the problem of overcrowding as well as that of suitable recreation. It will also enable medical aid to be summoned quickly when needed, and in many other ways contribute to the cause of health and public comfort. It will reduce the number of flies by reducing the number of stables and contribute largely toward municipal cleanliness.

There will be accidents at first, until the people learn that the question of safety and the immunity from danger lies with themselves, but the company has made arrangements for ample hospital facilities for the treatment of the injured. It is hoped that the gong of the electric car will sound the death knell of the "mañana habit," which has been responsible for its full share of sanitary failures and disappointments.

DEATHS FROM ACCIDENTS.

The number of deaths from accidents in the Philippine Islands, and especially in the city of Manila, is surprisingly small, even if those from accidental drowning and other marine casualties are included.

The faulty insulation of electric wires and the careless manner of suspending such wires have been sources of constant danger. The municipal board has taken the matter in hand and will require all the safeguards for the protection against accidents that can be provided.

It is likely that the number of accidents in Manila will increase now that the electric-car system has been established.

In this connection it is interesting to note that an enterprising firm, the Ericson Artificial Limb Company, of Minneapolis, Minn., has established an agency with A. S. Watson & Co. for the sale of their wares. This is, I believe, the first agency ever established in the Philippine Islands for the sale of artificial limbs.

MEDICAL ORGANIZATIONS.

The American Medical Association, at the meeting in New Orleans, May, 1903, authorized the affiliation of the Manila Medical Society on the basis of a State organization.

The society had been organized and brought up to a high degree of usefulness by the efforts of a few leading men of the profession, and its constitution and by-laws were so well adapted to the requirements of a local organization that it was deemed best, in order to preserve the integrity of the local society and at the same time to comply with the demands of the national association, to organize another body to be known as the Philippine Islands Medical Association.

The component societies recognized by the constitution of the organization are provincial, district, and local medical societies which are duly chartered by the association.

The constitution of the association contemplates the organization, as soon as conditions will permit, of a medical society in each province of the Philippine Islands.

The second annual meeting of the Philippine Islands Medical Association was convened in the library hall of the bureau of government laboratories, Manila, P. I., Wednesday, March 1, 1905, and was called to order by the president, Dr. J. R. McDill, at 4.10 p. m., and the exercises opened with the following beautiful prayer by his grace, the Most Reverend Jeremiah J. Harty, D. D., Archbishop of Manila:

"Be pleased, our Father, to look forth from Thine Own glory and communicate to this assembly of physicians something of Thy life which Thou has for Thyself and all Thy creatures. Grant that they may know Thy presence by the rising in them of that faith, that hope, that love, and all those affections so necessary for the successful physician. And we ask that Thou wilt bestow upon this assembly a comprehensive heart, so that there may be realized in them the immortal words of the great poet:

'A wise physician skilled our wounds to heal,
Is more than armies to the public weal.'

"God bless the doctors here assembled and all the world over, and let the domestic circles which have felt their help, their comfort, their restoration to health, say, Amen."

The address of welcome was delivered by the Hon. Dean C. Worcester, secretary of the interior.

THURSDAY AFTERNOON SESSION.

The meeting was called to order at 4 p. m. by the president. The address on beriberi by Prof. Erwin Baelz, University of Tokyo, was read by title, the author being unavoidably absent.

"Social Diseases," by Dr. Paul Clements, was read by title.

"Address on Forensic Medicine," by Judge E. F. Johnson, was read by title.

"The Philippine Constabulary Medical Service," by Dr. W. P. Baker, was read by title.

"A Search into the Nitrate and Nitrate Content of Witte's Peptone, with Special Reference to its Influence on the Demonstration of the Indol and Cholera Red Reactions," by Dr. William B. Wherry, was read by title.

"Glaucoma Among the Friars," by Dr. C. J. Miner, was read by title.

The following papers were read and discussed by the association and guests:

"Address on Immigration," by Dr. Victor G. Heiser.

"The Episcopal Dispensary and the Medical Care of the Indigent," by Dr. C. Radcliffe Johnson.

"The Control of Tuberculosis," by Col. D. M. Appel, U. S. Army.

FRIDAY AFTERNOON SESSION.

The association was called to order at 4 p. m. by the president.

The following papers were read and discussed:

"Address in State Medicine," by Maj. E. C. Carter.

"Measles in the Tropics," by Dr. Rudecindo Cuervo.

"Results of Cold Irrigation as Compared with Warm Irrigation in the Treatment of Gonorrheal Urethritis and Endometritis," by Dr. E. C. Shattuck.

"The Symptoms, Diagnosis, and Prognosis of Uncomplicated Intestinal Amebiasis (Amœbic Dysentery) in the Tropics," by Dr. W. E. Musgrave.

"The Medical Department of Bilibid Prison and Some of the Diseases among the Prisoners," by Dr. W. R. Moulden.

"San Juan de Dios Hospital," by Dr. R. E. L. Newberne.

"The Metropolitan Police Medical Service," by Dr. A. T. Short.

"Dentition in Relation to the Excessive Infant Mortality in Manila," by Dr. Louis Ottofy, D. D. S.

The following paper was read by title:

"The Organization, Management, and Medical History of the Civil Sanitarium at Baguio, Benguet." by Dr. J. B. Thomas.

SATURDAY AFTERNOON SESSION.

The association was called to order at 4 p. m. by the president.

The following papers were read and discussed:

"Address in Climatology," by Dr. W. S. Washburn.

"The Care of the Aged and Infirm," by Dr. M. Gómez.

"Evolution of the Medical Laboratory Work in the Philippine Islands and Opportunities now Offered for Future Work," by Dr. R. P. Strong.

"Chinese Medicine," by Dr. Tee Han Kee.

"History of Plague in the Philippine Islands," by Dr. M. Herzog.

"A few Observations on Relapsing Fever," by Doctor Koch, of Hongkong.

The following papers were read by title:

"The Military Medical Service in the Philippine Islands," by Maj. Charles Richard.

"Infant Mortality," by Dr. Luis de Castro.

"Disinfection of Ships," by Dr. J. D. Long.

"Some Unpublished Observations on Endemic Neuritis in the Philippine Islands," by Dr. J. M. Wheate.

"The Pseudo-diphtheria Bacilli," by Dr. E. H. Ruediger.

"History of Medicine in the Philippine Islands," by Dr. Aristón Bautista.

"Medical Laws, Customs, and Practices in the Philippine Islands," by Dr. John Maye.

"The Pathology of Intestinal Amebiasis," by Dr. P. G. Woolley and Dr. W. E. Musgrave.

"Broncho-pneumonia in Cattle; its Relation to Infection with Bacillus Bovisepticus," by Drs. P. G. Woolley and Walter Sorrel.

"A New Variety of Branuloma in Cattle Clinically Resembling Lumpy Jaw," by Dr. P. G. Woolley.

"Sarcoma of the Ciliary Body; a Case Report," by Dr. P. G. Woolley.

THE COLEGIO DE MÉDICOS Y FARMACÉUTICOS DE FILIPINAS.

The above-named society is an organization composed of the Spanish-speaking physicians and pharmacists of the Philippine Islands, governed by an elaborate and well-written constitution, modeled after the constitution of the American Medical Association.

THE PHILIPPINE CIVIL HOSPITAL.

The act under which this institution was established was passed October 1, 1901, and provided that there should be a civil hospital in Manila, known as the Philippine Civil Hospital, and that in the admission of patients preference should be given to officers and employees of the insular and provincial governments and of the city of Manila. Emergency cases among other civilians were to be received at the hospital and treated free of charge until such time as they could safely be removed. Civilians, other than civil officers and employees, were to be admitted for treatment up to the limit of the capacity of the institution, under such regulations as might be established by the attending physician and surgeon and the commissioner of public health and approved by the secretary of the interior.

In the absence of a general hospital this institution has been made to serve this purpose on the most liberal terms compatible with the organic act under which the institution was established.

The hospital has a well-trained corps of physicians, nurses, attendants, and employees. The business affairs are under the management of an experienced hospital superintendent, assisted by a well-selected clerical force.

This systematic arrangement permits the attending physician and surgeon or the chief of staff to devote the greater part of his time to the wards and operating rooms.

The civil hospital treats all classes of diseases, except infectious, which are sent to the new hospital for infectious diseases, conducted as a department of San Lázaro Hospital.

All the latest appliances in surgical practice are in use in the operating room of the civil hospital, and the institution aims to keep fully abreast with the scientific advancement of the profession in other parts of the world.

SAN LÁZARO HOSPITAL.

This hospital, mentioned elsewhere in this report, was originally founded for the treatment of lepers by the Franciscans in 1784, and has been conducted since that time under the name it now bears.

The institution is conducted by the board of health for the Philippine Islands, and is directly under the supervision of a medical officer designated as physician in charge, and one native physician, and a competent corps of trained nurses, attendants, and other employees.

There are five departments in this institution—a leper department, an insane department, an infectious disease department, a morgue and crematory department, and a department of steam disinfection. These five departments make up the San Lázaro Hospital.

The women's department, established by the military government and continued by the civil government, has been transferred to the Sampaloc Hospital in order to make room for the insane.

LEPER DEPARTMENT.

The leper department, on March 31, 1905, contained 243 patients—148 males and 95 females. Racially, there are 241 Filipinos, 1 Chinese, and 1 European.

The medical work of this department is performed by Dr. E. Mercado.

These people, as a usual thing, appear to be happy and contented, though their equanimity is considerably disturbed by their dread of being removed to the Culión leper colony.

If it is possible for victims of this loathsome disease to be happy, the inmates of this institution should be so, because everything that can be done to alleviate their condition is the first thought of those in charge.

THE INSANE DEPARTMENT.

This department was opened on November 13, 1904, and on the 31st of March, 1905, had 58 male patients and 19 female patients.

The stress of the problem of how to care for the insane, so far as the city of Manila is concerned, has been considerably relieved by the opening of this department.

Many unfortunates of this class, especially in the provinces, are suffering from the want of hospitalization.

INFECTIOUS-DISEASE DEPARTMENT.

This department consists of pavilions for plague, smallpox, and cholera, and special facilities for the treatment of other acute infectious diseases.

The buildings are arranged on the pavilion plan, constructed of hard material covered with rubberoid.

Each department of the infectious-disease hospital occupies a separate building, connected with the administration building by covered passages.

Patients suffering from infectious diseases are permitted to retain outside physicians if they prefer to do so.

The attitude of the natives to this hospital has undergone a great change for the better since the erection of the new building.

THE MORGUE AND CREMATORY.

The morgue and crematory are conducted as a special department of San Lázaro Hospital. Here are received the bodies of all whose death has been caused by infectious diseases, from violence, from unknown causes, or from any cause necessitating an autopsy or requiring legal investigation. The bodies of all paupers held for city burial are also received into the morgue.

For the seven months ending March 31, 1905, there had been 177 bodies received into the morgue, classified racially as 130 natives, 21 Chinese, 14 Americans, 12 Spaniards, and others.

The Japanese colony send its dead to the crematory, a fact which clearly demonstrates the inherent natural traits of progress and sound reasoning which characterize this race of people.

During the period included in this report there were 15 bodies cremated, of which number 10 were Japanese.

STEAM DISINFECTING DEPARTMENT.

This department is charged with the disinfection of all articles of wearing apparel, bedding, and all fabrics that may have become infected.

The new latest-model steam disinfecting plant has been installed and is now in use.

It has been the purpose of those who have been responsible for the success of these institutions to maintain them at a high standard of efficiency.

A detailed statement of all the departments will be found in the report of San Lázaro Hospital by the physician in charge.

SAN JUAN DE DIOS HOSPITAL.

In 1596, three hundred and nine years ago, the Brotherhood of Santa Misericordia established in Manila a hospital for the treatment of civilian poor, the first civil hospital in the Philippine Islands.

Little is known of the history of the hospital from the date of its establishment until 1656, a period of sixty years. However, the records of the bureau of archives show that the Brotherhood of Santa Misericordia continued in charge of the institution up to that time, when they were forced by circumstances entailed by a series of misfortunes, which began to beset the institution in 1646, to abandon the work which they had struggled so hard to continue.

Beginning with the year named and lasting for a period of ten years, misfortune followed misfortune in rapid succession. Earthquakes, violent storms, fires, failure of crops, loss of confidence, and dissatisfaction were the reasons assigned in the petition to the governor asking that the hospital be transferred to the Brotherdood of San Juan de Dios, which had come to the islands in 1641, and in the same year founded a hospital in Cavite, and in 1643 another for convalescents in Bagumbayan. In those early Spanish days no hospital which did not make special provision for convalescents was considered worthy of the name.

The transfer was approved by the governor in a decree dated March 26, 1656, and sanctioned by royal decree dated December 5, 1659, from which date the institution officially became the Hospital San Juan de Dios, and remained under the management of that brotherhood until 1866, when the order was suppressed in the Philippine Islands. The hospital then passed into the hands of the Sisters of St. Vincent de Paul with the provision that it should be supervised by a board of inspectors.

The history of the hospital may be divided into three periods, the first period of sixty years under the administration of the Order of Santa Misericordia, the second period of two hundred and ten years under the administration of the Brothers of the Order of San Juan de Dios, and the third or present period of about thirty-eight years under the dual administration of a board of inspectors and the Sisters of St. Vincent de Paul.

The hospital and hospital chapel were totally destroyed by the earthquake of 1863, three years before the institution passed into the hands of its present managers, who upon taking charge had to face a gloomy state of affairs. A hospital in a rented building, an increased number of patients, a diminished revenue, and a lawsuit to set aside the lease of the Hacienda de Buena Vista, in Bulacan Province, which had been so executed as to make some political friend the beneficiary in fact if not in name.

This lawsuit was decided in favor of the hospital in 1870, at which date the real history of the San Juan de Dios Hospital, as we know it to-day, began, though it has been conducted under the present management since 1866.

After the suit was decided in favor of the hospital, the Bulacan property was again leased and became an important source of revenue, and has continued so, with a few interruptions, to this date.

The hospital derives more or less revenue from certain real estate holdings in the districts of Intramuros, Binondo, San Miguel, Ermita, and some out-of-town property in Rizal Province.

Since July 1, 1903, the city of Manila has had a contract for 100 patients, paying at the rate of 70 cents United States currency a day for each patient.

No more charity patients are received into the hospital. Those who are not sent there by authority of the municipal board are required to pay, some one price and some another, according to their means.

The present management is vested in a board of inspectors, presided over by the provincial of San Francisco. The internal affairs are under the management of the Sisters of Saint Vincent de Paul, of whom there are 25, who do the nursing, the buying, and all the internal managing.

The chief medical officer is Dr. Joseph Donelan, who is assisted by Doctors Tornel, Valdez, Diaz Pérez, Burke. Del Val, and Anguita.

The hospital is a close corporation. Patients are not permitted to employ physicians who are not on the staff.

The capacity of the hospital is not definitely known, even to the management.

There are 11 private rooms for men and 10 for women, with ward accommodations for 500 or 600 patients. The number of patients in the hospital for 1904 averaged about 225 daily, 100 of whom were paid for by the city at the rate of 70 cents United States currency a day, the other 125 paying according to their means.

The hospital has a pharmacy and dispensary, a chemical laboratory, a bacteriological laboratory, and facilities for the studies of histology and pathology.

These laboratories and the wards are utilized by the faculty of the San José Medical College of the Santo Tomás University for the purpose of teaching clinical medicine. Several of the faculty of the medical school are on the staff of the hospital.

The San Juan de Dios Hospital has done an important work for the Filipinos and for the cause of medical education in the Philippines.

Whatever may have been the shortcomings of this institution in the past, it should not be forgotten that during the period from September, 1898, to July 1, 1903, during which time its Bulacan hacienda was practically idle and the revenues greatly diminished. no patient was turned away from the institution. Many an American owes his life to the charity of San Juan de Dios Hospital and to the ever watchful care of the sisters in charge.

ST. LUKE'S HOSPITAL AND DISPENSARY.

The Protestant Episcopal Church of America, in connection with its missions in the Philippines, has planned the establishment of a hospital in the city of Manila. The dispensary was opened during January, 1903. Daily clinics were held by a number of American and native physicians, who volunteered their services to aid this worthy cause.

In July of the same year Dr. C. Radcliffe Johnson was sent from the United States to take charge of the institution, and it is principally through his efforts that its dispensary service attained its present high degree of efficiency.

Doctor Johnson made an effort soon after his arrival to establish an emergency ward, but on account of the lack of sufficient funds this feature of the work had to be abandoned.

Bishop Brent, who is at the head of the institution, has recently returned from the United States, and it now seems to be an assured fact that at an early date a fully equipped hospital will succeed the present dispensary.

During the first year there were 1,409 patients and a total of 3,979 visits. The second year, recently completed, showed an increase of 135 per cent, or 3,326 patients, with 8,329 visits.

The carefully kept records show that tuberculosis leads in point of numbers, which is not surprising when the unhygienic habits of the people are considered, together with overcrowding and oftentimes the insufficiency of nutritious food. By far the greatest factor in the spread of this disease is the inability of these people to appreciate the necessity of care in expectorating.

Next to tuberculosis stand acute bronchial affections, commonest in children.

Intestinal diseases, entero-colitis and gastro-enteritis, come next. These diseases are also confined almost entirely to children of 2 years and under.

Forty-nine cases of dysentery were treated in the dispensary service of this institution last year, but in no case of those examined bacteriologically were amobæ found, probably due to the fact that many of the specimens were too old for examination and accurate determination of the specific cause of the disease.

During the past year 200 cases of beri-beri were treated, 20 per cent of the cases being among pregnant women.

The number of venereal diseases has been relatively small, while diseases of the skin and gynecological diseases were very common, as were malarial diseases.

In the eye and ear department, presided over by Dr. Clarence J. Miner, who gives his services free, there were treated during the last year 247 new cases.

The board of health has supplied a considerable portion of the drugs used, and the running expenses of the institution have been helped along by contributions from a few prominent business men. Some of the indigent patients have shown their appreciation by contributing small sums.

The St. Luke's Hospital and Dispensary deserves the moral and financial support of the charitably inclined people of Manila. The fact that its work has been carried on in a modest, unpretentious manner, in keeping with the character of the able man at the head of the institution, should not be an excuse for neglecting this worthy cause, which demands at once liberal financial acknowledgment.

ST. PAUL'S HOSPITAL.

The Sisters of St. Paul de Chartres, a French order of hospital and asylum sisters, have established, under the direction of the archbishop of Manila, a general hospital with a capacity of about 150 patients, which for the present will be conducted in the building on Calle Palacio, corner of Beaterio, formerly occupied by the municipal offices. This is probably the best constructed new building in Manila. It was originally intended for a seminary, and with a few alterations will make a magnificent home for the hospital and dispensary.

The leading medical men of Manila will be associated with the new institution, under Dr. John R. McDill as chief of staff. The main object is to make the hospital one in which patients will have the same advantages offered by the best modern hospitals of the world.

It is understood that the building on Calle Palacio is but the first of a series of structures which are to be devoted to hospital purposes as the institution grows in patronage.

There will be conducted, in connection with the hospital, a public free dispensary, where daily medical and dental clinics will be held by the leading physicians and dentists of the city. In this service no charge will be made, but in the hospital proper all who have the means are expected to pay; however, no deserving poor case will be turned away.

The emergency department was opened about April 1, 1905, and has contracted with the street-car company to care for all accident cases that may happen on any of its lines.

The hospital will be conducted as a nonsectarian institution, and bids fair to verify the statement of Doctor McDill that "St. Paul's Hospital will do all that similar institutions do in the large cities of the United States, only more, because there is more to be done."

GENERAL HOSPITAL.

Plans, specifications, and estimates for a general hospital for the city of Manila and the Philippine Islands have been carefully prepared and have been submitted to the secretary of the interior. Funds to carry out these plans are lacking.

The necessity for the hospital is so obvious that no words will make it clearer. The site selected is good and convenient, and in most ways more desirable than the site occupied by the "First Reserve" Hospital. In case the latter hospital should be turned over to the civil authorities, attention should be called to the fact that each surgeon who has been in charge of the "First Reserve" Hospital has found himself constrained to submit estimates for repairs which amounted to so much that the military authorities were unable to approve them.

While the results attained in the "First Reserve" Hospital have been admirable, the necessity for the changes above referred to still exists, and is likely to become more and more pressing, so that the question of expenses for repairs and of the expense of constructing a new and modern hospital should be carefully compared before the plans to construct a new hospital are abandoned.

While the "First Reserve" Hospital is built on the pavilion system, the pavilions are not arranged as conveniently as they might be, and are not constructed so as to obtain the best results in the matters of light, ventilation, cleanliness, etc.

As a temporary means of supplying hospital facilities to a considerable number of persons, the "First Reserve" Hospital may be considered satisfactory, but it is not sufficiently large, modern, or convenient to serve as a general hospital for the city of Manila.

The situation has been somewhat relieved by the establishment of the St. Paul's Hospital, under the Sisters of St. Paul de Chartres.

Private institutions, however well conducted, can never be made as satisfactory and efficient, under the circumstances, as a general hospital controlled by the government.

A modern hospital for the treatment of the sick and with special facilities for the clinical study of disease, a bureau of government laboratories, largely devoted to research work, and a central board of health, engaged in the work of general sanitation, with especial reference to the suppression and extermination of epidemic diseases, would indeed form a scientific trinity which would make Manila the medical center of the Orient.

I renew my recommendation, made in my second annual report, that any sacrifice not involving the peace of these islands should be made in order to secure a general hospital at Manila and proper and adequate hospital facilities at least in the principal cities of the Archipelago.

PROVINCIAL OR DISTRICT HOSPITALS.

All that has been said in my previous reports in regard to the necessity for hospitals in the provinces is still true. The need is great, but the means to establish and maintain these hospitals are not available.

No one who is not associated intimately with the people of these islands can realize how much unnecessary suffering exists among them or how many unnecessary deaths occur. Numbers of cases of deformities, of old wounds, injuries and dislocations, and of surgical diseases, as well as other ailments, are awaiting help at the hand of the surgeon or physician. I have very much hoped to see some of these district hospitals established by the government during my term of office. To me the need of hospitals seems the greatest, most obvious, and imperative need of these islands. The suffering, diseases, and deformities must be seen to be realized, and it is well known that those afflicted with diseases or deformities are likely to conceal themselves from public view, so that it is mainly the physician who comes in contact with them and who realizes their existence. A statement of statistics or a description of the cases will neither move nor touch as seeing them does.

It was hoped, too, that the establishment of these hospitals and their maintenance along scientific and charitable lines might have aided in convincing the inhabitants of these islands that the government has their good at heart. Fortunately the churches have not been slow to avail themselves of this means of doing good.

Plans, specifications, and estimates for the construction of 12 provincial or district hospitals have been worked out and submitted to the Commission.

In certain cases it was recommended that buildings already constructed should be leased. This recommendation was made in the interests of economy, but it is a well-known fact that old buildings not intended for hospitals make poor hospitals, and diminish the chances of recovery from diseases, wounds, or surgical operations.

These provincial or district hospitals were intended to contain 50 beds each, to be in charge of a competent physician and surgeon (American), assisted by one or more native medical men, pharmacists, some nurses, and the necessary number of servants.

They were to have a good operating room, a few rooms for pay patients or grave surgical cases, lying-in patients, etc.

If the plan of appointing district medical officers is carried out, and that plan is earnestly recommended, it is certain that much suffering may be relieved, many deaths prevented, and a strong factor to bring about confidence, reliance, and affection for the civil government introduced.

Almost all the work done in these hospitals would be gratuitous. The poor and helpless would be brought in, and the effect in winning the confidence of these people in the government would be considerable.

It is hoped that the district medical officers will not only be in charge of the provincial or district hospitals, but will also act as sanitary officers for the districts (which may contain several provinces) wherein they will be stationed.

It is believed that the district hospital will increase the influence of the district medical officers for good, and will enable them to keep abreast of their profession, a thing which a sanitary officer can not always do.

These hospitals must be provided with a few instruments of precision for diagnostic purposes, such as a good clinical microscope, and a small chemical laboratory for the qualitative and quantitative examination of the dejecta, blood, and other objects, because these hospitals will be too far from the central laboratory to avail themselves of its services in cases demanding early diagnosis.

It is not possible to practice medicine without the use of a microscope and a modest chemical apparatus, and any attempt to do so will result disastrously for the patients and to the humiliation of the practitioner.

It is not meant by this that a chemical or microscopical outfit will be needed when a hospital is so situated that the government laboratories may be available; for instance, a case of fever at Cebú may present symptoms of malarial and enteric fever. The use of a microscope at Cebú may eliminate the question of malarial fever or confirm it, but it would hardly be advisable to have at Cebú a bacteriological outfit to apply Widal's test for typhoid fever.

In some circumstances it is necessary to make a diagnosis promptly; for example, to determine the existence or not of acute nephritis. The microscope and a few chemical reagents will place the question beyond doubt. The same may be said in regard to a number of other diseases, including amœbic dysentery.

Speaking as a practitioner of over twenty years of experience, I repeat that no physician is justified in practicing his profession without the use of or access to a microscope, chemical apparatus, and other means of scientific diagnosis.

The points at which it seemed desirable to establish district hospitals are the following:

1. Aparri, Cagayán. Here a hospital will have to be built, as no building exists suitable for hospital purposes.
2. Vigan, Ilocos Sur. Here a suitable building may be rented.
3. Dagupan, Pangasinán. A suitable building may be rented.
4. San Isidro, Nueva Ecija. A suitable building may be rented.
5. Lucena, Tayabas. A building would have to be erected.
6. Cagayán, Misamis. A suitable building may be rented.
7. Albay, Albay. A building would have to be erected.
8. Iloílo, province of Iloílo. A building may be rented.
9. Cápiz, Cápiz. A building may be rented.
10. Cebú, Cebú. A building may be rented.
11. Tacloban, Leyte. A building may be rented.
12. Surigao, province of Surigao. A building would have to be erected.

It will be seen, therefore, if 12 district hospitals are to be placed in operation, and that number seems moderate, but sufficient for the needs of the people, that only 4 new buildings will have to be erected.

It is believed that about 12 more medical inspectors should be authorized ultimately.

There would then be, say, 30 medical inspectors in the service of the bureau of health for the Philippine Islands. This would enable that bureau to look after the sanitation of Manila and of all the islands, and enable it to dispense with the presidents of provincial boards of health.

As there are 31 presidents of provincial boards of health, 3 acting presidents, and a number of vacancies, it will be seen that the addition of 12 medical inspectors and the abolition of the presidents of provincial boards of health would result in a considerable saving of money.

The difficulties of transporting the sick from remote islands and provinces to the Civil Hospital in Manila, and the limited capacity of that institution, as well as the preservation of the lives of those who need hospitalization, all unite in emphasizing the need of these life-saving stations—provincial hospitals.

THE INSANE HOSPITAL AT LA LOMBOY.

While a board appointed to investigate the above-named locality reported favorably on it, it was stated that the buildings at present existing would not accommodate more than 80 persons, so that in order to build up a proper asylum more buildings would probably have to be constructed than would have to be constructed if San Lázaro were converted into an insane hospital.

The plans sketched for the hospital of San Lázaro would answer for La Lomboy also. The pavilion plan, with proper separation of pavilions, is the most sanitary, the most convenient for treatment, and the safest in case of fire.

San Lázaro has the advantage of being conveniently situated in Manila under the immediate observation of the bureau of health and the secretary of the interior and other officials. The transportation of supplies and patients would be reduced to a minimum; the purchase of supplies, stores, furniture, etc., would be easier, and the expenses would be less than they would be at a place as distant as La Lomboy is.

At La Lomboy roads would have to be constructed, which are always expensive. The roads at San Lázaro are satisfactory. The Commission, however, has not yet approved the plans for San Lázaro, but has approved of the plans for La Lomboy. This matter should be brought to the attention of the secretary of the interior and be laid before the Commission for its action. I believe the San Lázaro proposition is the better one of the two.

CONSTABULARY MEDICAL SERVICE.

Owing to the lack of available appropriations the medical service of the constabulary has not been organized in a way which its importance justifies. The prevailing conditions have made it necessary to appoint a number of nonmedical men to the position of medical inspectors, a fact which is to be greatly deplored.

In the provinces, provincial and municipal, health officers are required to act as constabularly physicians.

A few very creditable hospitals have been established in the larger towns of the islands.

The service should be more liberally provided for or placed under regular army surgeons.

MEDICAL SERVICE FOR THE NON-CHRISTIAN TRIBES.

Owing to the lack of a sufficient number of medical inspectors, it has not been practicable to maintain medical service in all the provinces of the non-Christian tribes.

A physician with a supply of medicines has been stationed at Cervantes, Lepanto-Bontoc, in the Igorrote country.

The attending physician and surgeon at the civil sanitarium at Baguio, Benguet, in addition to his other duties, looks after these people in the province of Benguet.

THE MEDICAL DEPARTMENT OF BILIBID PRISON.

The medical corps of Bilibid Prison consists of a resident physician, 2 American hospital attendants, an American druggist, 2 Filipino hospital stewards, and 40 prisoners, 3 Americans and 37 Filipinos, who have been detailed and trained to act as nurses and attendants. There are also a physician and a corps of attendants at the penal colony at Puerta Princesa, Paragua.

The medical work of the prison is carried on in two hospitals; Hospital A, the main prison hospital, located within the prison grounds, and Hospital B, for tuberculosis, situated on the south bank of the Pasig River, just east of the Ayala bridge.

Hospital A is situated in the northern part of the penitentiary, in a separate stone wall inclosure, isolated from the remainder of the prison. This hospital has an observation ward, in which are entered all incoming sick, who are there bathed, subjected to a thorough physical examination, accompanied by a microscopical examination of the blood, sputum, urine or stool, as indicated, a diagnosis made, after which the patient is sent to the proper ward.

In this hospital are five rooms set apart for the detention of new prisoners, who are examined for evidences of infectious diseases, vaccinated, and after a period of twenty-four hours, or longer if necessary, assigned to their respective brigades. There are also isolation rooms for the treatment of infectious diseases, when present; a dark room for diseases of the eye; appropriate rooms for affections of the ear, nose, and throat; a clinical ward for skin diseases and diseases of a minor surgical nature, a general medical ward, a surgical ward, an operating room, a diet kitchen, a drug room, a laboratory, and a morgue.

In a separate stone wall inclosure there is a special ward for women. This ward is supplied with attendants from the long-term women prisoners specially trained for the work.

Hospital B is a large, roomy building, open on all sides and surrounded by a spacious yard, well shaded by tropical vegetation. The sun and air have free access to all parts of the grounds and building, insuring to an unusual extent good ventilation.

Pulmonary tuberculosis has been present in 274 prisoners admitted during the past twenty months; of this number, 165 have died, 49 have recovered, and 60 are still under treatment in the hospital; of the number remaining in the hospital, about 20 show signs of improvement.

The establishment of this hospital has greatly relieved the situation in Bilibid. The prison is still overcrowded, and the medical duties are too arduous and exacting for the limited force.

The work in hospitals A and B is conducted under the immediate supervision of the American hospital attendants, who take orders from and are responsible to the resident physician.

The work of the Hospital A commences at 6 a. m., when the American ward stewards start their respective squads to work in the duties of the day. The resident physician holds sick call at 6.30 a. m. in a special room devoted to that purpose, prescribing for all patients who present themselves for treatment.

During the twenty months ending February 28 of this year 17,903 men reported at sick call, 32,315 visits were made in the various hospital clinics, and 2,080 patients were admitted to the hospital; of this number, 530 died and 1,550 recovered.

The resident physician, Dr. William R. Moulden, has had a wide and successful experience in hospital work. Prior to coming to the Philippines he had been resident physician at the Emergency Hospital and Central Dispensary in Washington City, and he no doubt owes much of his present success as a physician and surgeon to the thorough and systematic training which he received at that institution.

THE METROPOLITAN POLICE MEDICAL SERVICE.

The metropolitan police force of Manila was organized in January, 1901. It is composed of Americans and natives. At the present time its numerical strength is as follows: Americans, 12 officers, 336 men; natives, 6 officers, 416 men. There are also about 40 secret-service men, making, in all, 804 men.

The entire police force and about 130 officers and men of the Manila fire department are under the medical care of Dr. A. T. Short, police surgeon, and Doctor Roxas, assistant police surgeon.

All police and fire stations are visited daily, and sick records are kept. The sick are required to report to the surgeon at the station if they are able to do so; if too sick to attend sick call, the surgeon visits them at their homes. In cases where it is considered inadvisable to treat them in quarters they are sent to the Civil Hospital.

The police surgeon is accountable for all patients who answer the sick report until they are returned to duty.

All prescriptions are filled at the dispensary of the Civil Hospital without charge.

Patients of the police force convalescing from severe illness or operations, upon their discharge from the hospital, are transferred to the river and harbor station, as are also those who suffer from sore feet. The duty on the water front and in the bay is lighter and is of such a nature as to require very little walking.

The police ambulance is supplied with emergency dressings and with suitable appliances for handling the injured.

MUNICIPAL PHYSICIANS.

Manila is divided into seven health districts, and in each district there is one municipal physician, whose duty it is to attend the indigent poor in their homes and to prescribe for such as present themselves at the free clinics held at the board of health stations every morning except Sunday. There is another municipal physician on duty at the Sampaloc Hospital, making in all eight medical men who devote their entire time to this class of patients.

These physicians are intelligent, educated men, who have been selected after having passed a civil-service examination. It is not an extravagant statement to say that these eight men do as much good as any other eight men in the city of Manila, regardless of race, profession, or attainments. Statistics of this service may be found elsewhere in this report.

FREE MUNICIPAL DISPENSARIES.

There are three municipal dispensaries, one in Tondo, one in Quiapo, and one in Paco, where the poor are supplied with free medicines and medical supplies. Here are filled the prescriptions of the municipal physicians and the district medical inspectors.

The question of the continuance of the municipal pharmacies is under consideration. That these institutions are productive of good and that they render assistance to the most needy and helpless class of persons are obvious facts, but they are an element of some expense, and at present necessity exists for the reduction of all expenses connected with the bureau of health.

OTHER FREE DISPENSARIES.

Free dispensary services are special features of the St. Luke's Hospital and the St. Paul's Hospital.

Dr. Annie Norton, formerly a Methodist missionary, has opened a dispensary in Santa Mesa district in which medicines are dispensed practically at cost.

With all these opportunities to get something for nothing the Filipinos have not abused the privileges extended to them.

MUNICIPAL MIDWIVES.

The board of health employs for the city of Manila one Spanish and seven Filipino midwives, who attend without charge all confinements occurring among the poor of their respective districts.

They are provided with maternity bands and with antiseptic dressings for the cord and are instructed by the district medical inspectors and the municipal physicians in the principles of obstetrical cleanliness.

Nearly all of the midwives employed in this service hold certificates of graduation from the Santo Tomás University, and all are duly registered in accordance with the provisions of Act No. 310, regulating the practice of medicine and surgery in the Philippine Islands.

The municipal midwives render such assistance as they are capable of to a most needy class of persons. In general it may be said that these municipal midwives, while not properly prepared for their work, are less improperly prepared than the other women who would attend lying-in cases if the municipal midwives were discharged.

MUNICIPAL FREE CLINICS.

Except on Sundays, free municipal clinics are held every day, from 8 to 9 a. m., for the treatment of the poor. This service is conducted by the municipal physicians under the supervision of the medical inspectors.

Statistical information is published elsewhere in this report showing the extent of the service.

CARE OF THE INSANE, THE AGED, THE ORPHANS, AND OTHER UNFORTUNATES.

This is a problem that has given the board of health no little concern. A recent census of the insane of the Philippine Islands shows 2,272 men and 1,840 women, or a total of 4,112.

The demands made upon the health authorities of Manila made it necessary to remove the women's department of San Lázaro Hospital and fit up the quarters formerly used for this class of patients as an insane ward. There are at present 76 insane persons confined in the insane department of San Lázaro.

Through the kindness of His Grace the Archbishop of Manila, the contract with the Hospicio de San José has been continued, the number of insane therein being 151. In this hospital are 38 old people and 137 orphans who are paid for at special contract price by the board of health.

The Hospicio de San José should be relieved of the insane in order that more room might be made available for the care of the old people and the orphans.

While hospital facilities for about 4,112 insane patients are needed, only 227, or about 5.52 per cent, have been cared for in the San Lázaro Hospital and the Hospicio de San José in the city of Manila. No provisions have been made for the provincial insane.

There are in the various provinces of the islands about 3,651 blind people who sooner or later will become public charges.

While no accurate statistics in reference to the deaf and dumb are available, the matter of providing a special school for this class of unfortunates must at no distant date engage the attention of the central legislative body.

THE BOARD OF MEDICAL EXAMINERS.

The practice of medicine and surgery in the Philippine Islands is regulated by Act No. 310, administered by a board of three physicians appointed by the commissioner of public health for the Philippine Islands.

The principal features of the law are similar to those of the medical law of New Jersey and other progressive States of the Union.

Examinations are required of applicants for the practice of medicine in the Philippines, and in addition they must exhibit diplomas from reputable medical colleges so recognized by the board of health for the Philippine Islands.

It has been very fortunate for the medical profession of the islands as well as for the people themselves that this up-to-date law was enacted in time to prevent the influx of that undesirable class of so-called physicians from the United States and other countries that would have flocked to the Philippine Islands if the passage of the medical law had been delayed.

There is one medical college in the Philippines and another in contemplation, as will be seen in another part of this report.

BOARD OF DENTAL EXAMINERS.

The practice of dentistry in the Philippine Islands is governed by a special law, Act No. 593, which requires an examination of all applicants for the certificates of the board of dental examiners. The administration of the law by the board has been very satisfactory.

The board of health causes to be made, from time to time, inspections of dental officers for the purpose of securing compliance with the dental law and the observance of dental hygiene.

There is no dental college in the Philippines.

BOARD OF PHARMACEUTICAL EXAMINERS.

As in the case of medicine and dentistry, the practice of pharmacy in the Philippine Islands is regulated by special legislation, Act No. 597, administered by a board of pharmaceutical examiners.

The pharmacy law is modeled after similar laws in the States.

The secret service of the Manila police department has caused during the past six months over fifty arrests for violations of the pharmacy law. This procedure has caused an increased respect for the law in many places where violations were frequent before.

There have been also several arrests and convictions in the provinces for violations of this act.

There are two colleges in the Philippines in which pharmacy is taught.

INDUSTRIAL TAX.

All persons practicing as physicians, dentists, or pharmacists must pay a prescribed industrial tax in compliance with the internal-revenue law, which also requires the fixing of revenue stamps to all documents of record connected with the actions of the respective boards.

BOARD OF HEALTH LIBRARY.

All the reference books of the library of the bureau of public health have been formally transferred to the bureau of government laboratories, only such as are in daily use being retained on memorandum receipt and placed in the custody of a clerk who acts as librarian for this bureau.

MEDICAL EDUCATION IN THE PHILIPPINES—SANTO TOMÁS UNIVERSITY.

There is only one medical college in the Philippine Islands, the San José Medical College, a department of the Santo Tomás University.

The university was organized as the College of Santo Tomás in the year 1612 and made a university in 1645; however, the medical department was not legally organized until 1876, although medical instruction has been included in the curriculum since 1871.

The medical course, including the study of the collateral branches, extends over a period of seven years and costs, including the diploma fee, something less than ₱500 for the entire course.

The published list of the medical faculty contains 81 names. The active professors and teachers number about one-fourth of this number.

The clinical and laboratory instruction is given in the San Juan de Dios Hospital.

PROPOSED MEDICAL COLLEGE.

The committee on public policy and legislation of the Philippine Islands Medical Association has recommended that a medical school be opened as a department of the proposed university of the Philippine Islands, and on the 21st of last January the following communication was forwarded through the honorable secretary of public instruction to the governor-general by the committee on public policy and legislation of the Philippine Islands Medical Association:

"MANILA, P. I., *January 21, 1905.*

"Hon. LUKE E. WRIGHT,
"*Civil Governor, Philippine Islands.*
"(Through the Honorable Commissioner of Education.)

"SIR: The Philippine Islands Medical Association, through the undersigned committee on public policy and legislation, have the honor to call the attention of the government to the fact that one year from next June, and in increasing numbers every year hereafter, between 400 and 500 Filipino young men and women will have been educated in the public schools to a degree which will admit them to the freshman class of the proposed university; that many of the young men approaching this period of their career have probably already decided upon their future calling, and it is equally certain that many of them will enter one of the professions.

"As it is now deemed of utmost vital importance in the educational world that all professional schools and their faculties should constitute an intimate and integral part of a university and its faculty, and as the first two years' study of branches of several of the professional courses as now constituted can be given with the greatest advantage in the collegiate departments of a university, it is recommended that a board of university regents, either provisional or permanent, be appointed without delay to investigate and report upon the possibility of the early formation of some of the professional and academic courses as parts of a university plan, so as to enable graduates from the public high schools or normal schools to continue the elective studies that pertain to the vocation of their choice as a part of their university and professional education.

"As the future school of medicine especially interests your petitioners, attention is called to the well-known predilection of the Filipinos for the profession of medicine and to the almost total absence of educated Filipino medical men in the provinces, where they are more needed than any other class of professional men, whole provinces being without one graduate of medicine. Suggestive statistics are found in the report of the Philippine health board for this year, which shows that 52 per cent of deaths in Manila alone occurred without medical attendance and that 50 per cent of the new born die within a year, and also in the data collected by the Philippine Islands Medical Association, as follows:

Total population of the Philippine Islands	7,635,426
Total physicians	360
Percentage of physicians to population	1 to 21,209
Manila:	
Population	219,928
Physicians	217
Percentage of physicians to population	1 to 1,013
Entire provinces, including other cities:	
Population	7,415,498
Physicians	143
Percentage of physicians to population	1 to 51,786
Land area, Philippine Islands, square miles	115,000
Average population, square mile	67 to 1
Average number of physicians, excluding Manila, do	1 to 430

"Until university graduates can arrange for the advanced or senior college of medical and other professional schools, we would point out that the government laboratories and their personnel, together with the staff of the board of health, educational and other departments could furnish even to-day the facilities and the faculties for nearly all the fundamental branches taught in the first two years of junior college work, so far as not only a medical, but also a general scientific course is concerned, namely, anatomy, chemistry, physiology, pharmacology, pathology, bacteriology, embryology, zoology, and botany.

"It is again urged in favor of immediate creation of this board of regents, that the fifteen months before the graduation of the prepared students above mentioned is none too long for the solution of the multitude of complex questions which will come before them, since they must of necessity invite the various professors to cooperate in regard to establishing their respective professional schools.

"As no immediate expense is involved in following this suggestion, and, as before stated, the amount of study, investigation, and labor, demanded on the part of the proposed board of regents to submit comprehensive and working plans to meet the conditions in these islands will consume many months, we trust the government can see its way to make immediate provision against these needs of the future in this direction."

It should not be inferred from the foregoing that there is a demand for American or European physicians in the Philippines. It is almost as difficult for a physician to establish a practice in the Philippines as it is in the United States. Physicians before coming to the Philippines to locate should carefully consider the question. The law regulating the practice of medicine and surgery is in keeping with the standard demanded by the most progressive States of the American nation.

THE UNITED STATES PUBLIC HEALTH AND MARINE-HOSPITAL SERVICE.

This branch of the public service has charge of all matters pertaining to the sanitation of seagoing vessels.

The quarantine laws of the United States are enforced here, and the same careful method of disinfection of ships and their fumigation for the purpose of destroying vermin are observed.

The Service maintains a laboratory for investigation at 78 Calle Madrid, Manila, and a disinfecting station at Mariveles, in Bataán Province, and an administrative office in the custom-house.

The chief quarantine officer of the Philippines is Dr. Victor G. Heiser, who has been appointed to succeed me as commissioner of public health.

QUARANTINE OF SEAGOING VESSELS.

The quarantine of seagoing vessels is principally conducted by the United States Public Health and Marine-Hospital Service; however, the act organizing the municipal boards of health places the matter of municipal quarantine in the hands of the local authorities, where there is no national health officer.

In all larger ports of the Philippines this important branch of public sanitation has been conducted by representatives of the National Quarantine Service in that thorough and scientific manner which characterizes their work everywhere.

IMMIGRATION.

Immigration for the Philippine Islands is regulated by the laws of the United States. Alien immigration has not been an important factor in increasing the population of the Philippines.

During the fiscal year ended June 30, 1904, there arrived in the Philippine Islands 6,111 immigrants; of this number 351, or nearly 6 per cent, were rejected for medical causes. The rejections were nearly all made because of diseases excludable under the law. Paralytics, idiots, insane, those suffering from leprosy, active syphilis, tuberculosis, and other diseases likely to make the newcomers a burden upon the government are rejected.

While there has been considerable discussion in the United States as to the advisability of making the immigration laws of Congress apply in their entirety in the Philippines, there has been no objection expressed as to the application of the medical features of the law which are administered under the supervision of the United States Public Health and Marine-Hospital Service.

The most common disease for which rejection is made is valvular disease of the heart.

The majority of immigrants are laborers, and the occupation which they follow necessarily indicates their rejection. The question of rejecting immigrants should be viewed from two standpoints, first, whether there is any danger from infecting the inhabitants of the islands with diseases from which they do not now suffer, and, second, from an economical standpoint.

With regard to the introduction of communicable diseases, the ones most likely to be introduced would be trachoma and favus, the latter being a contagious disease of the scalp and, more rarely, of the finger nails. Trachoma prevails only to a very limited extent and in a mild form among the Filipinos.

These medical examinations by the officers of the quarantine service have been made of great value in excluding the more virulent cases of these diseases from other countries, which, if they were allowed to enter, would spread very rapidly. Trachoma was made an excludable disease in 1897. The medical profession, and more particularly the physicians in charge of the eye clinics in large cities, urged this step. The contagious character of the disease constantly led to the infection of others. A case of trachoma introduced into a crowded tenement would often cause the disease to spread throughout the whole block. The cost of treating trachoma was becoming a heavy expense to the country. Further investigations showed that 15 per cent of the inmates of public blind institutions in the United States had lost their eyesight through this disease.

Trachoma seems to have had its origin in Egypt, and, with the increased facilities for travel, it has spread throughout the entire world. So contagious is the disease in the land of its origin that but few of the natives escape an attack. Those who have visited Egypt have no doubt observed the unusually large number of blind persons that are seen upon the streets of the cities.

In 1901 positive cases of pulmonary tuberculosis were placed upon the excludable list. This step was denounced as unnecessary and inhuman. However, when it is remembered that the disease is very communicable, and that many of the immigrants would soon become public charges, the wisdom of the course becomes at once apparent.

The enforcement of the medical clause of the immigration law has been of great benefit to the Philippines, both from a humantarian and practical standpoint.

PLAGUE.

In my first annual report was included a special report on this disease by Dr. Edward L. Munson, captain and assistant surgeon, U. S. Army, who was at that time detailed as assistant to the commissioner of public health.

Dr. Maximilian Herzog, pathologist and necroscopist, bureau of government laboratories, had also made a careful study of the disease. Doctor Herzog read at the second annual meeting of the Philippine Islands Medical Association a paper which is submitted as a part of this report, entitled, "Bubonic plague in the Philippine Islands from its first outbreak in 1899 up to 1905," and from which it is noted that during the five years ending with 1904, Manila had over 1,000 cases of plague, while Hongkong had over 5,000.

Of the Manila cases 632 occurred among 21,230 Chinese, or 29.8 per thousand of the Chinese population. Hongkong, with a Chinese population of over 200,000, during the same period had over 5,000 cases, or about 25 per thousand. This comparison between the Hongkong and Manila figures leads to the surprising revelation that the liability to contract plague and die from it for the period under discussion has been almost identical for the Chinese in these two cities, with a slight difference in favor of Hongkong. On the other hand, the large Filipino population of Manila, a considerable portion of which does not live under any better hygienic conditions than the Chinese, has, per thousand, been only one-fortieth as liable to contract the disease.

The methods employed by the board of health in its warfare against plague are the isolation of those sick with the disease, the protective inoculation of contacts, the cleaning and disinfection of all houses in which plague cases occur, and when deemed necessary the remodeling of such houses.

Another measure which has been employed on a large scale is the extermination of rats. If plague-infected rats are caught in houses in the neighborhood of plague houses, these houses and their inmates are treated as though cases of the disease had occurred.

In order to prevent the incoming of infected persons or rats from foreign ports the strictest precautions are observed.

During the period of the greatest prevalence of plague practically all vessels arriving were fumigated once, if no more. The board of health kept a force of rat catchers along the water front to fumigate the small vessels plying in the river and harbor.

The energetic measures which have been carried out more or less intermittently ever since the time when the disease first appeared in Manila have enabled the health authorities to keep the disease under control. In 1902 it appeared as if the plague had been completely suppressed, but in 1903 there was a recrudescence, and in 1904 there were 84 cases. In 1904 the city was free from the disease for several months during the last half of the year, but from September 1, 1904, to March 31, 1905, there were registered 23 cases of which 22 proved fatal.

Plague of to-day has lost much of the terror that it insipred in times gone by. This is due to the fact that its cause has been accurately determined, and improved methods have been adopted for its extermination and suppression.

CHOLERA.

The cholera epidemic of 1902–3 has passed into history with its sorrows and its lessons. The tragedy of that period, when 110,000 persons perished can not be forgotten by those whose duty it was to aid and comfort the people. And the tragedy was made the more heartbreaking by the denial of certain physicians, at the beginning of the epidemic, that cholera existed; the unfounded reports of poisoned wells, which resulted in the detention and trial of several persons, all of whom were acquitted.

Every effort was made to check the epidemic at its outset, but owing to the impossibility of establishing an absolute quarantine these efforts only served to delay the disease. So evident was it to the commissioner of public health that all these precautions against the spread of the disease were doomed to failure that he felt compelled to state over his signature to his chief in Washington that nothing could be done except to relieve, so far as possible, the sufferings of the sick and destitute, and that the epidemic would cease only when the vulnerable material was exhausted.

Among the lessons taught by the epidemic are the following:

1. Recognize cholera at the beginning; that is not difficult clinically or microscopically.
2. Acknowledge it frankly; control it in its incipiency by heroic means, if necessary.
3. Provide stores and comforts for the sick and destitute.
4. No method for treatment, so far developed, save one, perhaps, is satisfactory. Intestinal antisepsis, by whatever means attempted, including acetezone and silver salts, is most untrustworthy. It is at least probable that the remedies used for antisepsis do harm. The method of securing from the coma bacillus a product that may counteract the cardiac depressing poison of the disease, as explained by the accomplished director of the bacteriological laboratory, Dr. Richard P. Strong, offers a ground for hope more rational than any curative method known to the writer.
5. In conclusion, while cholera is perhaps the second greatest epidemic scourge known to men, it is one that may be controlled and defined, if not removed, by wise legislation and authority, by the education of the people in sanitation and hygiene, and by the spreading abroad a knowledge of the necessity of using boiled water and hot, cooked food. The wise Chinese know this. They drink tea and eat hot rice, and very few Chinese, proportionately, succumbed to cholera during the recent epidemic. But certain persons attributed this immunity to the use of opium, which is truly a valuable drug in cholera, and many natives assert that they contracted the opium habit in trying to avoid cholera.

As I stated in my second annual report, there is no doubt that quarantine is the most effective measure that can be used against the spread of cholera, but to be of value at all it must be absolute—that is, against the sick and the well alike.

LEPROSY.

The number of lepers in the Philippine Islands has been estimated to be from 10,000 to 30,000. The bureau of health has a record of only 3,715, of whom 2,377 are males and 1,338 are females.

Revised statistics have not been received from all the provinces, but it is believed that the total number of lepers in the entire archipelago, including the Moro Province, will not exceed 5,000.

The type of leprosy prevalent in the Philippine Islands is relatively mild as compared with the character of the disease in many other countries.

The leper problem is far from a satisfactory solution. The segregation of these unfortunates in the colony at Culion will not be unattended by disappointments and perhaps failures. However, in the course of time they may become reconciled to the isolation.

The opening of the new colony will work the beginning of a new order of things in the care and treatment of these unfortunates, who, notwithstanding their condition, are sensitive and proud and quick to notice any infringement upon their inherent and inalienable rights.

The following table shows the distribution of lepers, by provinces, together with other important facts relative to their condition:

Reports received of lepers living in the various provinces of the Philippine Islands to March 31, 1905.

Province	Race.	Males.	Females.	Children.		Single.		Married.		Widowers.	Widows.	Total.
				M.	F.	M	F	M.	F.			
Abra	Filipinos	6	5	1	....	4	3	1	2	.....	.....	11
Albay	do	38	26	4	4	25	14	7	5	2	3	64
Ambos Camarines	do	54	15	6	.....	23	7	20	7	5	1	69
Antique	do	60	48	13	14	20	15	21	15	6	4	108
Bataán	do	18	6	1	1	10	1	4	2	1	2	22
Batangas	do	20	11	....	...	14	5	5	2	1	4	31
Benguet[a]	do	32	11	1	1	1	...	21	10	9	.. ..	43
Bohol	do	78	65	6	8	34	39	35	12	4	1	133
Bulacán	do	25	14	.....	....	10	7	13	7	2	.....	39
Cagayán	do	50	46	...	....	23	16	24	19	3	11	96
Cápiz	do	39	16	1	.. ..	17	12	16	4	5	.....	55
Cavite	do	49	24	....	2	30	15	16	3	3	4	73
Cebú	do	591	283	93	38	326	187	159	42	13	16	874
Ilocos Norte	do	70	45	2	2	25	24	41	13	2	6	115
Ilocos Sur	do	144	79	11	2	72	14	44	20	17	13	223
Iloilo	do	94	32	9	1	54	17	22	5	9	9	126
Isabela	do	11	6	.....	.....	3	.....	7	3	1	3	17
La Laguna	do	22	13	1	2	9	5	10	4	2	2	35
Lepanto-Bontoc[a]	do	15	4	1	....	5	1	8	....	1	3	19
Leyte	do	57	41	9	7	19	16	26	11	3	7	98
Masbate	do	13	11	...	.....	7	4	3	4	3	3	24
Misamis	do	39	11	4	.....	17	5	15	3	3	3	50
Moro[a]	Moros	143	77	3	3	86	44	45	18	9	12	220
Negros Occidental	Filipinos	23	8	2	2	9	6	11	....	1	.....	31
Negros Oriental	do	67	53	4	.....	27	23	35	21	1	9	120
Nueva Ecija	do	36	15	1	...	16	5	15	5	4	5	51
Nueva Vizcaya	do	2	4	.. .. ..	..	1	..	1	2	.....	2	6
Pampanga	do	8	7	.. ..	.. ..	3	6	4	2	1	.. ..	15
Pangasinán	do	35	24	.. ..	1	11	5	18	14	5	4	59
Rizal	do	64	27	2	2	34	10	28	13	.. .. ..	2	91
Romblón	do	4	10	..	..	1	3	3	6	.....	1	14
Sámar	do	143	115	.....	1	43	50	74	43	26	21	258
Sorsogón	do	80	37	.. ..	1	41	18	35	9	4	9	117
Surigao[a]	do	2	1	.. ..	.. ..	.. ..	....	.. ..	..	2	1	3
Tárlac	do	17	10	1	..	2	5	13	5	1	....	27
Tayabas	do	19	7	1	....	6	4	11	1	1	2	26
Unión	do	29	15	.. ..	.....	10	10	17	3	2	2	44
Zambales	do	35	30	..	...	18	14	14	9	3	7	65
San Lázaro Hospital, Manila	do	147	96	23	12	81	50	81	18	12	16	243
Total	.. ..	2,377	1,338	199	99	1,187	689	873	362	168	188	8,715

[a] Revised reports not received.

TUBERCULOSIS.

Pulmonary tuberculosis has been declared by ordinance in the city of Manila to be an infectious disease, dangerous to the public health, and physicians are required to report in writing, upon blanks furnished by the board of health, every case of the disease that comes under their observation.

It is also required that managers, commissioners, superintendents, physicians, or other persons in charge of public or private hospitals, dispensaries, asylums, infirmaries, and wardens of prisons, principals and teachers of public and private schools or convents, and officers of other public institutions in the city of Manila report in writing every person afflicted with tuberculosis who is in their care.

It is the duty, as defined by ordinance, of every person sick with tuberculosis, and of every person in attendance upon any person sick with this disease, and of the authorities of public and private institutions, to observe all sanitary rules and regulations of the board of health and all city ordinances directed against the spread of pulmonary tuberculosis and other infectious diseases.

During the period from September 1, 1904, to March 31, 1905, there were 750 deaths from tuberculosis in the city of Manila.

Bilibid Prison has established a special hospital for this class of patients. The San Juan de Dios Hospital maintains a large isolation ward for consumptives.

Notwithstanding the important work which has been done, very little progress toward lessening the disease has been made. The great mass of the people have not been reached, and the best way, or, in fact, any way, to disseminate among them the knowledge of how to prevent this dread disease is still to be found.

AN ORDINANCE AGAINST SPITTING IN PUBLIC PLACES.

In view of the fact that only a small fraction of the inhabitants of the Philippine Islands live in Manila and of the almost absolute hopelessness of enforcing a more stringent ordinance, the board of health, in preparing an ordinance against expectorating in public places, decided that it would be advisable to deal only with the most urgent features of the question; therefore a short ordinance was presented to the effect that, "in order to prevent the spreading of pulmonary tuberculosis and other infectious diseases, all persons are forbidden to spit or expectorate or deposit or place any sputum, saliva, phlegm, or mucus upon the floor of any church, schoolhouse, theater, or other place of public assembly, or upon the inside furnishings or equipments, or upon any place upon the outside, or upon any platform or any street car or public conveyance while the same is in use upon any of the streets or highways in the city of Manila, or in any manner defile or pollute the floor furnishings, equipments, or platforms, or any street car or public conveyance while in use upon any of the streets or highways of said city."

This is but the beginning of what for many years will be an unavailing warfare against the expectorating nuisance.

INTESTINAL AMŒBIASIS (AMŒBIC DYSENTERY).

This disease, the statistics of which are given elsewhere, has been very prevalent during the past year. It numbers among its victims all ages, all classes, and all races, its favorite victims being unacclimated adult Americans. It causes more than 50 per cent of invalidism in the public service, and must be reckoned in profit and loss accounts of business enterprises, and it enters as an important factor in the army hospital reports.

Water is the principal source of infection, and the majority of cases can be traced directly or indirectly to the use of unsterilized water. The city water of Manila contains a large number of protozoa and amœbas, not distinguishable from those found in intestinal ulcers of dysentery. The danger from the use of unsterilized water has become generally recognized by the public, and an effort has been made to overcome this danger. Much of the so-called distilled water in the city is either not distilled at all or stored in reservoirs which are not properly cared for. Sometimes sterilized water may be contaminated by handling, and thus convey the disease.

The surfaces of uncleaned green vegetables and fruits are another important source of infection.

Intestinal amœbiasis has been the subject of careful study and investigation by Dr. W. E. Musgrave, pathologist of the bureau of government laboratories. The results of his research work were published in October, 1904, in bulletin No. 18, bureau of government laboratories, which may be had by making application to the chief clerk of that institution. Doctor Musgrave is a recognized authority on this disease.

On November 1 the secretary of the interior addressed the following letter to the commissioner of public health:

"SIR: I have the honor to inform you that I have appointed the following committee to consider methods of combating amœbic dysentery and to recommend to the board of health an ordinance containing such provisions as the committee deems likely to be of practical use to this end: Maj. E. C. Carter, Dr. Richard P. Strong, and Dr. W. E. Musgrave. The committee will meet at the call of the chairman.

"Very respectfully,

"DEAN C. WORCESTER,
"*Secretary of the Interior.*"

The committee met and reviewed the existing laws and ordinances and those proposed in the new sanitary code for the city of Manila and decided that the question had been fully covered, but recommended that a special inspector be designated to examine at such times as he sees fit all places where and apparatus whereby waters, beers, and other drinks are manufactured.

The two important things that the school should bear in mind are the methods of prevention and the importance of an early recognition of the disease after infection.

BERIBERI.

This is a common disease in the Philippine Islands, particularly among the poorer classes. The disease prevails very generally in provincial jails. It attacks all classes, but Filipinos and Chinese are more susceptible than Americans and Europeans.

Plenty of sunlight and fresh air, with cleanliness and a nitrogenous diet, may be considered specifics at least in preventing the disease.

Beriberi as a factor in infant mortality and as a probable factor in insanity is worthy of the closest study and investigation.

MALARIAL DISEASES.

Accurate statistics of the prevalence of malarial diseases in the Philippine Islands are not available, but according to the observations of American and European physicians practicing in this country malaria is by no means as common a disease as it is in many parts of America and Europe. However, where the infecting mosquitoes are found in large numbers the disease is generally prevalent.

The natives know the value of quinine and laxatives, but are extremely skeptical in reference to the methods of infection. They are not ready yet to believe so serious a charge against the mosquito. In the interior of the islands, especially in the southern groups, the disease is of a rather severe type.

During the period of seven months covered by this report the record of deaths kept by this bureau for the city of Manila shows that there were 110 deaths ascribed to malarial causes.

TYPHOID FEVER.

This disease can not be classed as a common disease in the Philippines, though during the seven months ended March 31, 1905, the death records of the city of Manila show 88 cases.

It is classified by the board of health as an infectious disease, and all houses in which cases occur are disinfected, particular attention being paid to possible sources of infection. As the preventable nature of the disease becomes more generally known there will be fewer cases.

TRAINED NURSES.

The day is not far distant when the "cirujano ministrante," with his imperfectly defined status and superficial training, must give way to the scientifically trained nurse, who will not assume a hostile attitude toward the menial, unpleasant services often required of the profession. Only in this way can the insanitary "muchacho" be eliminated from the sick room, where his presence under the present system is indispensable.

Except in the larger hospitals under the care of Sisters of Charity the trained nurse was unknown in the Philippine Islands until the advent of the Americans.

A training school in connection with a suitable hospital in which young men and women may be prepared for this useful and honorable profession is one of the needs of the country.

MARRIAGE STATISTICS.

The ordinance defining the duties of the board of health in the city of Manila makes it obligatory that the said board keep an accurate record of all marriages celebrated within the limits of the city. To comply with this requirement a chapter on marriages was incorporated in the proposed sanitary code, making it the duty of all justices of the peace with whom certificates of marriages are filed in compliance with General Orders 68, series of 1899, issued by the United States military governor, to make monthly reports to the board of health for the Philippine Islands on forms prescribed by the commissioner of public health.

The board of health is also given authority to call for such reports from persons who solemnize marriages as may be needed for statistical purposes.

According to the present marriage law any unmarried male of the age of 14 years or upward and any unmarried female of the age of 12 years or upward, and not otherwise disqualified, are capable of consenting to and consummating marriage on condition that the consent of the father, mother, or guardian, or of the one having the charge of said persons, if any such, be given if the male or the female be under 21 years of age. The entire law, while very liberal, has proved satisfactory. No

absolute divorces are granted; however, marriages may be annulled for causes enumerated in the law. Jurisdiction in cases of nullity is vested in the courts of first instance.

Upon the question of the advisability of granting absolute divorce there is much difference of opinion, with which the sanitary authorities are not directly concerned. It is hoped that the next annual report will present the required statistics.

BIRTH STATISTICS.

It is practically impossible to collect accurate birth statistics in the provinces under the present system. The advent of a new baby in a family is an event to be expected, and its arrival is not considered exciting enough by the Filipino to justify any special effort in the interest of statistical information.

Under Spanish rule these matters were left entirely to the churches, to be recorded in connection with the sacrament of baptism, which was an advent in the life of every person in the Philippine Islands who had been brought under the influence of the church.

Even in the city of Manila it has been very difficult to present more than an estimate of the number of births. Repeated efforts have been made to obtain accurate reports, but the result is far from satisfactory. When the returns for the fiscal year are complete it will be possible to submit a fairly accurate estimate, based upon the number of births that have been reported, the death rate among children, and certain other information that will be presented by the completed statistics. I shall leave these deductions for my able successor, who no doubt will give the matter the attention it deserves.

DEATH RATE IN MANILA.

For the seven months ending March 31, 1904, the death rate among the permanent population of Manila, by races, is as follows:

Race.	Deaths.	Annual average per 1,000.
Americans	24	9.42
Filipinos	5,904	49.10
Spaniards	32	21.80
Other Europeans	8	12.33
Chinese	201	16.55
All others	12	23.10
Total and average	6,184	44.56

The figures for the remaining five months will be compiled by my successor and presented as a complete statement for the year.

The city death rate for last year reached 49.01 per thousand, while for the period covered by the above table the rate is 44.56, a difference of 4.45 per thousand in favor of the present year.

The lowest death rate was in San Nicolás district, which with a population of 53,573 had during the seven months only 563 deaths, or an annual rate of 18.13 per thousand. The highest has been in the district of Tondo, which with a population of 39,045 has had 1,695 deaths, or an annual rate of 74.79 per thousand. The figures here given include transients. The low death rate for San Nicolás district, which is far from being the most healthful district in the city, may be explained by the fact that the greater number of its inhabitants are unmarried Chinese, thus eliminating the factor of infant mortality.

The annual death rate, including transients, based upon the mortuary tables for the seven months ending March 31, 1905, by districts, is as follows:

District.	Death rate.	District.	Death rate.
San Nicolás	18.13	Sampaloc	61.08
Tondo	74.79	Intramuros	30.98
Quiapo	49.95	Ermita, Paco, and Malate	60.80
Santa Cruz	57.16		

Station L, health district No. 7, includes Ermita, Malate, Paco (where most of the American population reside), and also the districts of Santa Ana and Pandacan. The infant mortality among natives of Paco, Santa Ana, and Pandacan is specially large, and is the principal factor in the unfavorable showing made by this district.

INFANT MORTALITY.

The table of deaths, by ages, including transients, for the period of this partial report is as follows:

Ages.	Number of deaths.	Ages.	Number of deaths.
Under 30 days	638	50 years to 60 years	240
30 days to 1 year	2,699	60 years to 70 years	183
1 year to 2 years	297	70 years to 80 years	124
2 years to 5 years	213	80 years 90 years	69
5 years to 10 years	71	90 years to 100 years	42
10 years to 15 years	64	100 years and over	11
15 years to 20 years	212	Unknown	17
20 years to 25 years	247		
25 years to 30 years	374	Total	6,245
30 years to 40 years	422	Stillbirths	173
40 years to 50 years	322		

From these figures it will be seen that of the 6,245 deaths, 3,847 occurred among infants less than 5 years of age.

The three periods of the highest mortality, arranged according to numerical importance, are: 30 days to 1 year, 2,699; under 30 days, 638; 30 years to 40 years, 422.

It will be seen that the period from thirty days to one year is the critical period in the life of children.

DEATHS OF TRANSIENTS.

The number of transients in the city of Manila in the mortuary statistics is eliminated from the city death rate as it is not properly chargeable thereto. Manila is the hospital center for the entire Archipelago, a fact which will explain the seemingly large number of this class of deaths. Many patients are brought in to the hospitals as a last resort.

Notwithstanding the practice of counting out transients in figuring the mortality rate of the city of Manila, there are still many deaths of this kind recorded as "permanents," which are necessarily charged to the city death rate. Deaths among students are usually recorded as belonging to the "permanente" class.

It may be observed from the statistics that deaths among transients are generally due to acute diseases, the exceptions being the deaths of those who are brought to the Hospital San Juan de Dios in the last stages of a fatal disease.

DEATHS WITHOUT MEDICAL ATTENDANCE.

The tabulated statistics will show the number of deaths in the city of Manila without medical attendance. This condition of affairs can not be ascribed to any single reason, but may be sought for in many, among which is the racial tendency to put off things until a more convenient time. This trait, commonly called the "mañana habit," is responsible also for many other unsatisfactory conditions in the Philippines. Another factor is the prevailing idea that physicians are not to be disturbed during meal time, the afternoon siesta, or at night after the hour of retirement. The inherent fatalistic beliefs and racial indifference of the natives must also be reckoned with in considering this question. The birth and the death of a child are two of the most commonplace events pertaining to family life, and in many instances the medical man has no part in either.

The board of health makes ample provisions to meet all demands for free medical attendance, and many lives are thus saved annually.

When I assumed the duties of commissioner of public health, nearly three years ago, the number of deaths without medical attendance exceeded the number with medical attendance, but the statistics from September 1, 1904, to March 31, 1905, a period of seven months, in a total of 6,245 deaths, show that 3,277 deaths were with medical attendance, and 2,968 were without medical attendance.

ILLEGAL MEDICAL PRACTITIONERS.

The board of medical examiners, under the provisions of the Act No. 310, regulating the practice of medicine and surgery in the Philippine Islands, has practically reduced the illegal medical practice to a few "mediquillos," who carry on their business so guardedly as to escape the law; to a few old women who practice midwifery, and to the Chinese, who have been tolerated so long as they have confined their practice to their own race. Most of these Chinese doctors have drug stores which they conduct under the restrictions imposed by Act No. 597, regulating the practice of pharmacy in the Philippine Islands, and administer their remedies in connection with the practice of "Chinese pharmacy."

It is almost impossible to differentiate the illegal Chinese doctor from the legalized Chinese druggist, especially when there is a prospective charge of practicing medicine illegally.

The medical act has proved to be a very efficient protection agaist a class of parasites styling themselves "doctors," that would curse Manila by their presence, if the legal restrictions were removed. Chinese "practicantes" limit their efforts to the practice of Chinese medicine.

CHINESE MEDICINE.

At the meeting of the Philippine Islands Medical Association, Dr. Tee Han Kee, an educated Chinese physician, read an interesting and scholarly paper on "Chinese medicine," in which he sketched the history of medicine as practiced by the Chinese from its origin, 3,000 B. C., to the present time.

The first period, from the time of Emperor Sinlong down to Confucius, embraces about 2,280 years; the second period of about 1,800 years, dates from Confucius to Emperor Shunte, the first emperor of the present dynasty; the third period, covering about 268 years, began with Emperor Shunte and extends down to the present time.

The first period is sometimes referred to as the "dark age," the second as the "progressive age," and the third as the "retrograding age."

The therapeutic writings of Emperor Sinlong, the second of the dynasty of the first rulers, are still standard text-books.

Medicine attained its highest development in China during the second period, which developed many physicians and surgeons of renown. During the "progressive age," many important operations in surgery were undertaken as, for instance, amputation of the arm at the shoulder joint under anaesthetics.

The physicians of that day were sufficiently advanced to give mercury in syphilis and practice smallpox inoculation. This method of protection from smallpox still prevails in many parts of China, although the more desirable practice of vaccination has been introduced from Europe and practiced to a considerable extent.

Inoculation was performed in four different ways: By wearing the clothing of smallpox patients, by inoculating the contents of pustules of persons suffering from smallpox into the mucous membrane of the nose, by blowing pulverized scabs taken from infected persons directly into the nostrils of the person to be inoculated, and by inserting high up into the nose fresh scabs which were retained for five days by tampons of moist cotton. The latter method is considered the best, and is at this time in general use over a large part of China.

During the last 268 years, or the "retrograding age," medicine in the Empire of China has almost become a lost "art." There are now no schools, and medical instruction is obtained chiefly through apprenticeship to instructors, who, for fear of competition, will not give his disciple the benefit of all his knowledge and experience, reserving the better things for himself in order that he may always know more than his pupils.

The modern practice of Chinese medicine is far enough removed from all that is scientific to satisfy even the most ardent Christian scientist. Some of their remedies are as absurd as they are ineffectual; for instance, a piece of paper on which has been drawn a few fancy lines and strokes is burned and the ashes taken with tea to dislodge bones from the throat, or for driving away the besetting devils in case of high fever.

In many diseases they use more substantial remedies made from spiders, cockroaches, human urine, and a thousand other things equally as disgusting. Some of the better class of practitioners resort to infusions or teas of certain medical plants of real therapeutic value, chiefly those possessing purgative and diuretic properties. This system ignores the teachings of pathology and bacteriology. Diagnosis of diseases, if it may be so called, is made almost entirely from pulse beat. A Chinese

doctor may feel the pulse of one or both wrists for hours, or until both he and his patient fall asleep, if the case presents any complications.

Pregnancy is determined, and the sex of the child foretold, by the character of the pulse. If a mistake is made it is readily explained by enumerating a long list of complications which obscured the diagnosis.

It is contrary to the Chinese idea of hygiene to give a patient a bath or to open a window to admit fresh air in his room, for fear of increasing the disease. In the Chinese hospital in this city this line of treatment is adhered to.

It is interesting to observe that, notwithstanding the innate dislike which Filipinos have for the Chinese, they have readily accepted their medical teachings to which they still adhere with a zeal and fidelity worthy of a better cause.

Disease is classified as "hot" or "cold." A "hot" disease requires a cooling medicine, and a "cold" disease calls for a heating remedy; thus it will be seen that they have to their credit the one fact that their "system" of medicine has at least escaped the fallacies of homeopathy.

Heating drugs must be gathered during the daytime during the summer months when the weather is warm, and must be prepared by the aid of fire, while, on the other hand, cooling drugs require to be gathered at night during the winter, in order that they may possess the proper therapeutic value.

One of the principal text-books of the Chinese medical student is called "Eighty-one difficulties," the same being a treatise on diagnosis as indicated by the pulse.

When it is difficult to make a diagnosis a Chinese doctor will feel the pulse of the radial artery for a whole day at a time, by this means becoming acquainted with all the diseases from which the patient may have suffered during his whole life. Their ideas of anatomy and physiology are crude and without system.

The Chinese race, with their devotion to the past, their reverence for the knowledge of the ancients, their love for the literature of their country, their extreme conservatism, and the tenacity with which they cling to superstitious traditions, will be slow to adopt scientific medicine, but the day will come when the truth shall prevail in China and among Chinese and all the world over.

The leaders are not yet ready for a change. The Chinese colony of Manila has been of ability and character, but these same men are in many cases patronizing this class of illegal but tolerated practitioners.

Dr. Tee Han Kee, a regular, ethical, scholarly Chinese physician, is employed by the board of health in the capacity of municipal physician for the Chinese. His work as a physician and as a sanitarian has been characterized by ability, judgment, and loyalty.

CHINESE DENTISTRY.

The Chinese consul has been very much interested in an effort to secure a modification of the present dental law so as to permit Chinese dentists to practice their art among Chinese residents of these islands, as are Chinese druggists, basing his claim upon the fact that the practice of dentistry, like the practice of medicine, has not attained the status of a profession in China, and that the Chinese practitioners are not prepared to meet the requirements of the dental law, which prescribes that all applicants must pass a satisfactory examination in anatomy, physiology, histology, physics, chemistry, metallurgy, dental anatomy and physiology, dental materia medica, therapeutics, dental pathology and bacteriology, orthodontia, oral surgery, operative dentistry, and prosthetic dentistry.

It would undoubtedly be class legislation to amend the law in favor of any particular race. The only argument in favor of granting the request is the fact that in China, except in foreign colonies, no legislative restrictions are placed upon foreigners who engage in the practice of medicine or dentistry.

CHINESE DRUGGISTS.

Act No. 597, regulating the practice of pharmacy in the Philippine Islands, provides that the board of pharmaceutical examiners shall issue a certificate as Chinese druggist to any person 21 or more years of age, and of good habits and moral character, who shall submit a certificate from the Chinese consul at Manila that he is competent and qualified to conduct a drug store in accordance with the laws and customs of the Chinese Empire. The board, however, may demand such other evidence as to the applicant's fitness to conduct such a store as it may deem advisable.

Since druggists are recognized as legal practitioners of medicine in the Chinese Empire, and the law permits druggists thus registered to practice in accordance with the laws and customs of their country, the board of medical examiners has not attempted to enforce the law regulating the practice of medicine and surgery among these people.

The law has not granted concessions to any other nationality, nor has any been requested. Chinese are not slow to act, and they are constantly on the alert for business opportunities, whether they are to be secured through legislation or otherwise.

GENERAL SANITATION IN THE PROVINCES.

This work is conducted by the local health authorities in accordance with acts Nos. 307 and 308, organizing provincial and municipal boards of health and fixing their powers and duties.

About three-fourths of the authorized number of medical inspectors are detailed for provincial duty. The special reports of the provincial medical inspectors are herewith appended.

Monthly provincial reports made up from monthly municipal reports are submitted by presidents of provincial boards of health. These reports are made pro forma, so as to be readily available for statistical purposes, and when received in the office of the secretary of the central board of health they are carefully examined, and, if found correct, transferred to an annual summary form, province by province. If they are found to be incorrect, the discrepancies or omissions are noted and the report returned for correction. This system of careful checking involves a great amount of work, but experience has shown that it is the only way by which the principle of accuracy—the indispensable requisite of vital statistics—can be maintained.

CEMETERY DISPUTES AND THE CLOSING OF CHURCHES AGAINST PUBLIC FUNERALS.

The closing of cemeteries is governed by municipal ordinances, in accordance with the provisions of the municipal code. Health boards can exercise advisory powers only. Many disputes have arisen as a result of religious enmity incidental to the Aglipay movement, or the establishment of the Independent Filipino Catholic Church. These disputes in many cases have been referred to this office, but as they involved the question of religious prejudice it has been advised that they be taken to the provincial boards or to the courts for settlement.

Act No. 469, entitled "An act for authorizing provincial boards to hear and determine controversies arising in municipalities by reason of municipal ordinances regulating religious processions and the closing of municipal cemeteries," provides that "In all cases of municipal ordinances regulating religious processions or closing municipal cemeteries an appeal may be taken from the enforcement of such ordinance or ordinances to the provincial board of the province by the persons interested therein. The provincial board, upon a sufficient notice to the interested parties and upon hearing, shall confirm, modify, or nullify such ordinance or ordinances as it may deem best for the public interest, its decision in the matter to be final: *Provided, however*, That where such ordinance or ordinances have been enacted not for the public good, but in bad faith and because of prejudice or hatred, the court of first instance having jurisdiction of the municipality and province shall have power, upon complaint properly filed, to enjoin the enforcement of such ordinance or ordinances in whole or in part because of such bad faith, prejudice, or hatred only. Upon questions involving the public health the opinion of the president of the provincial board of health shall be requested by the provincial board, but his opinion shall be advisory only."

In cases where municipal councils have closed cemeteries on the recommendation of the local health authorities, careful investigation has usually demonstrated the correctness of the position taken by the health boards; although, in the circumstances, it is reasonable to assume that there were other factors which, to a large extent, determined the action of the local sanitary authorities.

The board of health has submitted to the Commission a draft of an act for the regulation of cemetery matters and the question of public funerals.

In every case in which it was alleged that the local health authorities had made false representations in reference to the condition of the cemeteries, this office, upon investigation, found that the sanitary conditions fully justified their action. It is probable that more zeal than tact was displayed in their recommendations, but the fact remains that the cemeteries were not in a sanitary condition.

Two of the principal cases have been in Cavite and Batangas. The following reports of Dr. Arlington Pond will give a clear idea of the situation in these two provinces:

"MANILA, P. I., *August 27, 1904.*

"The COMMISSIONER OF PUBLIC HEALTH,
"*Manila, P. I.*

"SIR: In compliance with special orders, No. 125, office of the board of health for the Philippine Islands, I have the honor to submit the following report of an inspec-

tion made of the sanitary condition of the old Caridad Cemetery, at Cavite, P. I., to ascertain if its sanitary condition is such as to allow it to be reopened for interments.

"This cemetery is about a mile and a half from the boat landing, and, while it is not in the crowded part of the town, there are people living in close proximity to it. Its dimensions are approximately 300 by 250 feet. In this space bodies have been buried for nearly forty years. This means that old bodies were being constantly exhumed to make place for new ones and the old ones were sent to the depository or bone pile, which is a custom to be discouraged and not encouraged.

"Looking the ground over carefully, it was seen that vacant spaces for new bodies are few and far between, and there are only 20 empty niches in the wall.

"As the cemetery is filled to its full capacity, and as the custom of removing bodies to make space for new ones is not in accordance with our American ideas and should be discouraged, as the cemetery is not in good sanitary condition, there being a very perceptible odor of decaying animal matter, and as the new cemetery on the beach is excellently located and has plenty of room in which to expand, I recommend that the request to reopen this cemetery be disapproved.

"Very respectfully,

"ARLINGTON POND,
"*Medical Inspector, Board of Health.*"

"MANILA, P. I., *September 5, 1904.*

"The COMMISSIONER OF PUBLIC HEALTH,
"*Manila, P. I.*

"SIR: In compliance with special orders, No. 136, office of the board of health for the Philippine Islands, I have the honor to submit the following report:

"In 1902, during the cholera epidemic, by order of the board of health, no funeral services were allowed to be held over dead bodies in the churches of Batangas Province. In most cases the funeral services were held in the churches, but the bodies went directly from the house to the cemetery, and in many cases services were held there.

"This law was necessary, and its wisdom at that time was not questioned by the people. The scarcity of doctors in the province made it impossible to distinguish death due to cholera from those due to other causes.

"This law has never been rescinded, and even at the present time no funerals are being held from the churches. The church authorities, supported by some of the Catholic residents of the towns of Batangas and Lipa, wish to get this order rescinded and to be allowed to return to the old order of things as before the cholera epidemic, and have forwarded a petition to that effect signed by thirty-eight residents of Batangas.

"The provincial and municipal health authorities, for various reasons enumerated by indorsements on the petition, are opposed to the granting of this request, the sum total of their reasons being that they think it is better for the health of the province not to return to the old way. In this they are supported by a large proportion of the Catholic residents of the town of Batangas, who, after the arrival of the undersigned, drew up a counter petition signed by over fifty prominent people of the town, which is hereto attached. The curé of Batangas, in an interview with the undersigned, stated that they based their petition on the following facts:

"1. That the province was free of epidemic diseases.

"2. That the burial of the dead from the churches was an old custom and very dear to the people.

"3. That the province of Batangas, as far as he knew, was the only one in the islands forbidden that custom.

"Furthermore, he stated that the church would give all assistance in its power to the board of health, and even agreed to furnish a building to be used as a morgue where bodies could be inspected by the municipal doctor before being allowed to go into the church.

"The presidente of the town was next interviewed. He expressed great surprise to think that the wisdom of the present law should be questioned, although he admitted that he had heard of the petition of some of the residents, but that the petitioners represented only a small percentage of the Catholics of the town. Personally he was satisfied with the present status of things and he was sure the majority of the people of the town also were.

"Governor Aguilar made practically the same statement as the presidente, but in addition he wished it understood that the question of religion did not enter into the controversy on the part of those opposed to the rescinding law; that they were all good Catholics and there was not a follower of Aglipay in the province, and that the priests were opposed to the law because it decreased their revenues.

"The provincial treasurer and the superintendent of schools (the supervisor had already placed himself on record as being in favor of the present law), two Americans in close touch with the natives, said that the whole trouble was due to a very small percentage of the people, led by the priests of Batangas and Lipa, but that in the other towns of the province everybody was apparently satisfied. They both assured the undersigned that the question of religion did not enter into the feelings of the people who opposed the rescinding of the law.

"Many other people, both natives and Americans, were seen regarding this matter and the majority of them said they had heard of the matter but had never given it any thought.

"If what the people interviewed said is true, the priests and their followers are very much in the minority, though the undersigned in all his experience in health work in the Philippines has never known so many people anxious to support the laws of the board of health where those laws interfered with a church custom.

"If it resolves itself into a question of sanitation pure and simple, everything points favorably to a continuation of the present law. From a sanitary standpoint there is nothing in favor of having funerals from churches. The lack of doctors make it impossible to ascertain the causes of death in all cases, and the lack of undertakers makes it impossible to have bodies properly coffined.

"There are only three towns in the province with doctors as presidents of the boards of health. These are Batangas, Lipa, and Taal, and in these towns all bodies could be examined and, if deaths were due to noncontagious diseases, funerals could be held from the churches. (In all other towns diagnoses are made by the municipal doctors.) But to make exceptions of these three towns would make trouble. There must be some general law to cover the whole province. Since cholera times there have been no funerals from the churches. This in itself is a good indication of the feelings of the people, or else a good example of the discipline and strength of the provincial government.

"Bodies properly coffined, unless they are cases of smallpox, plague, cholera, leprosy, or some other contagious or infectious disease, can cause no damage, but if this question is to be settled solely from a sanitary standpoint it will be settled in favor of the continuation of the present law.

"Very respectfully,

ARLINGTON POND,
"*Medical Inspector, Board of Health.*"

These questions in Manila have never given any special trouble. They are fully covered in the present city ordinances and in the proposed sanitary code.

The board of health for the Philippine Islands has drawn and submitted to the Commission a draft of an act for the regulation of these vexatious questions, entitled,

"AN ACT regulating the establishment and maintenance of burial grounds and cemeteries, and covering public funerals and the disposal of the dead in the Philippine Islands, outside the city of Manila.

"*By authority of the United States, be it enacted by the Philippine Commission, that:*

"SECTION 1. This act shall apply and be effective throughout the Philipine Islands, except in the city of Manila, which shall be governed by the provisions of the sanitary code of Manila, as provided for in act No. 1150.

"SEC. 2. Except in the city of Manila, which is not included in this act, it shall be unlawful in the Philippine Islands for any person or persons, or for any order or society of persons, or for any corporation or corporations, or for any church or other organization whatsoever, to bury or inter their dead, or use any land or lands in any way whatsoever as a burial place or as a temporary or permanent place of interment or disposal of such dead, within 50 meters from either side of any river or rivers, or any water, or within 50 meters of any spring, well, or other source of water supply: *Provided*, That the board of health for the Philippine Islands may, upon the recommendation of the local health authorities, authorize the continuance of any burial ground, cemetery, or other place for the temporary or permanent disposal of the dead not meeting the requirements of this section which may have been established prior to the passage or this act.

"SEC. 3. After the passage of this act no burial ground or cemetery shall be authorized or established which shall not be at least 25 meters from any dwelling house: *Provided*, That abandoned houses, houses used by employees or attendants of the cemetery, houses used for administrative or other necessary purposes connected with the cemetery, shall not, in the meaning of this act, be considered as dwelling houses: *And provided further*, That it shall be the duty of the person or persons, or of the order or society of persons, or of a corporation or corporations, or of a church or other organization establishing such cemetery, to maintain an open space, unob-

structed by habitations or other structures, except those for ornamental purposes, and except as hereinbefore provided, of at least 25 meters on all sides of said burying ground or cemetery.

"SEC. 4. Subject to the approval of the board of health for the Philippine Islands, the council of any municipality may set apart any tract of land, or part thereof, belonging to the municipality, as may be deemed advisable for a municipal burying ground, and may designate any portion thereof as a place of burial for the poor, and no charge shall be made therefor; and the council may lay out the remaining unoccupied portion in suitable lots, with the necessary paths, avenues, or other reserved spaces, and may plant and embellish the same with trees, shrubs, and flowers, and other rural ornaments; and the council, or any person designated by it, may grant and convey, for and in the name of the municipality, by deed or other legal conveyance, lots in such burial ground or cemetery to be used for the burial of the dead, and on which to erect tombs, cenotaphs, and other monuments. Land so acquired shall be exempt from taxation, attachment, or levy of execution.

"SEC. 5. The proceeds realized from the sale of such lots shall be deposited in the municipal treasury and kept separate from other municipal funds and may be disbursed by order of the municipal council upon properly prepared and signed vouchers for the purpose of keeping in order, improving, and embellishing such burial grounds or cemeteries.

"SEC. 6. Municipal councils may make, alter, amend, or repeal when made such by-laws and regulations, except upon sanitary questions, not inconsistent with law, as may be necessary for the government and administration of such burial grounds or cemeteries, and such by-laws and regulations shall be recorded by the municipal secretary, and certified copies filed with the local board of health and with the board of health for the Philippine Islands. No by-laws or regulations shall be made to restrain or interfere with any person in the full exercise of his religious sentiments respecting the burial of the dead, nor shall any municipality in prescribing rules and regulations for a burial ground or cemetery make any discrimination against the burial of bodies on account of race, nationality, or religion.

"Sanitary by-laws and regulations shall be made by the local authorities and approved by the board of health for the Philippine Islands.

"SEC. 7. Municipal councils may designate the municipal board of health or any member thereof to act as its representative in the administration of municipal cemeteries, and such organization or officer shall perform the duties thus imposed without extra compensation.

"SEC. 8. Municipal councils may take and hold grants, gifts, or bequests of property or money, provided that the terms and conditions of same are not in conflict with law nor detrimental to the just and proper administration of such burial grounds or cemeteries, and apply the same for the improvement or embellishment of municipal burial grounds or cemeteries or any part thereof, or for the erection, preservation or removal of monuments, fences, or other structures in or around said burial grounds or cemeteries, according to the terms of the grant, gift, or bequest, and in cases where such grants, gifts, or bequests have been made without terms or conditions, they may be applied for such improvement of the municipal burial grounds or cemeteries as the council may deem advisable.

"SEC. 9. Municipalities shall have authority to acquire sites for burial grounds or cemeteries by purchase, or by condemnation in the manner prescribed by law, and such land when acquired shall be exempt from taxation, attachment, or levy of execution during the time it shall be used as a burial ground or cemetery.

"SEC. 10. All questions of ownership, disputes of title, breach of contract, and other controversies or disputes, except those which refer to sanitation, shall be decided by courts of competent jurisdiction: *Provided*, That such questions, controversies, and disputes can not be satisfactorily adjusted by administrative action.

"All questions of sanitation shall be submitted through the local board of health, there be one, and if there be no local board of health, through the municipal secretary, to the board of health for the Philippine Islands, the decision of which shall be final.

"SEC. 11. Any burial grounds, cemeteries, or other places for the burial or interment of the dead, not a municipal cemetery, may be enlarged, with the approval of the municipal council, by making application through the local board of health, or to the central board of health for the Philippine Islands, and complying with the requirements of the law in reference to the establishing of burial grounds and cemeteries. Municipal cemeteries may be enlarged or extended by the municipal council in the same manner as provided for their establishment.

"SEC. 12. The board of health for the Philippine Islands shall have authority to close any burial ground or cemetery, whether conducted by municipalities, societies, corporations, churches, or otherwise, whenever it shall have been adjudged

that such cemetery is a menace to the public health. Any municipal council, with the approval of the board of health for the Philippine Islands, may close any cemetery within the limits of the municipality over which it has jurisdiction, and may also cause the removal of such cemeteries when absolutely necessary: *Provided*, That no cemetery shall be removed without the approval of the board of health for the Philippine Islands and of the Secretary of the Interior.

"SEC. 13. Municipal councils shall grant a permit to any person, society, corporation, or church, or other organization, to establish and maintain burial grounds and cemeteries, upon the presentation of an application approved by the local board of health, and by the board of health for the Philippine Islands filing with the municipal council an approved bond in the sum of 500 pesos, Philippine currency, to be renewed annually, for the faithful compliance with the law and the maintenance of such burial ground or cemetery in clean and sanitary condition; and for each and every permit thus issued a fee of not to exceed 25 pesos, Philippine currency, may be charged and collected: *Provided*, That no fee shall be collected nor bond required for the enlargement or extension of any cemetery established prior to the passage of this act.

"SEC. 14. When practicable, graves shall be dug to a depth of at least 5 feet, so there may be at least 3 feet of earth covering bodies that have been inclosed in coffins, boxes, or other solid receptacles, and at least 4 feet of earth covering uncoffined bodies.

"SEC. 15. No decision or action of any provincial board of health or any municipal board of health, except in cases of emergency affecting the question of burial grounds, cemeteries, or disposal of the dead, shall be valid until the same is approved by the board of health for the Philippine Islands.

"DISPOSAL, EXHUMING, AND SHIPMENT OF THE DEAD.

"SEC. 16. Except in cases of emergency, no corpse shall be buried without a certificate of death. If there has been a physician in attendance upon the deceased, it shall be the duty of the said physician to furnish the required certificate. Should no physician or medical officer be available, it shall be the duty of the municipal president or municipal secretary to furnish the required certificate.

"SEC. 17. Death certificates shall contain the name of the deceased, age, sex, nationality, occupation, whether married or single, widowed or divorced, date of death, place of death, cause of death when known, duration of illness, residence of deceased, whether deceased was a permanent or transient resident of the municipality in which he shall have died, whether the deceased had medical attendance and if so the length of such attendance, the name and address of the physician attending, and whether there are indications of violence or crime, and such other information as may be required for identification or statistical purposes. The death certificate should be forwarded to the municipal secretary within forty-eight hours after death.

"SEC. 18. If the person who furnishes the certificate has any reason to suspect, or observes any indication of violence or crime, he shall at once notify the provincial fiscal, if he shall be available, or if not, the municipal president, who shall take the proper steps to ascertain the circumstances and cause of death, and the corpse of such deceased person shall not be buried or interred until permission is obtained from the provincial fiscal, if he be available, and if not, from the president of the municipality in which the deceased shall have died.

"SEC. 19. The municipal secretary, as secretary of the local board of health, if there be one, or if there be no local board of health, in his capacity as secretary of the municipality, shall, upon the presentation of death certificates, issue burial permits, under conditions prescribed by the municipal council and the local sanitary regulations.

"No permit to bury, inter, or remove for burial or interment elsewhere, or cremation, of any human body shall be recorded or issued by a board of health or a municipal secretary until the certificate of death hereinbefore required shall have been registered: *Provided*, That in cases of emergency the municipal secretary of the municipal president shall have authority to furnish the required certificate. In cases of death before the passage of this act, where no certificate has been furnished, he may make the required certificate from such data as may be available.

"SEC. 20. No sexton, superintendent, or other person having charge of a burial ground or cemetery shall assist in, assent to, or allow any interment, disinterment, or cremation to be made until a permit from the municipal secretary, or municipal board of health authorizing the same, has been presented.

"SEC. 21. Any permit for burial, interment, or cremation shall be null and void after a period of forty-eight hours has elapsed from the time of issue of said permit. Except when required by law, or when specially authorized by local health authorities, no dead body shall remain unburied for a greater period than forty-eight hours after death.

"Whenever it has been certified, or is known that any person died with contagious, infectious, or communicable disease, such body shall be buried within twelve hours after death, unless otherwise directed by a board of health.

"SEC. 22. A special permit may be issued by the board of health or by the municipal secretary for the conveyance of a dead body to sea whenever a person has, before death, expressed a desire for burial at sea: *Provided*, That the body be transported as prescribed by the board of health, and that the marine laws governing burials at sea are complied with.

"SEC. 23. The body of any person dead of infectious or contagious disease shall not be carried from place to place, except for the purpose of burial or cremation. It shall be the duty of the local health authorities to cause such dead body to be thoroughly disinfected before being prepared for burial, and the house, furniture, wearing apparel, and everything capable of conveying or spreading infection shall also be disinfected or destroyed by fire. The local board of health shall prescribe the conditions under which bodies dead with infectious, contagious, or communicable diseases shall be buried or cremated, except as hereinafter provided.

"SEC. 24. The removal of any body from its original place of interment is declared to be a nuisance and prejudicial to public health, unless the same shall be done by permission and under the direction of a board of health.

"Permission to disinter or exhume the bodies or remains of persons who have died with noncontagious, noninfectious, or noncommunicable diseases may be granted after such bodies have been buried for a period of three years. The body or remains of a deceased person upon exhumation shall be immediately disinfected and inclosed in a coffin, case, or box, securely fastened, and this coffin, case, or box shall be placed in an outside box, which shall also be securely fastened. Special permits may be issued for the disinterment or exhumation of deceased persons who have died with noncontagious, noninfectious, or noncommunicable diseases after a period of one and one-half years has elapsed if it be found that such disinterment or exhumation of remains will not be to the detriment of the public health: *Provided, also*, That special permits may be issued at any time for the disinterment or exhumation of remains of persons dying with noncontagious, noninfectious, or noncommunicable diseases that have been properly embalmed by an undertaker or embalmer, or that have been placed in a receiving vault awaiting transportation from the Philippine Islands, and that the boxes containing the bodies or remains be plainly marked with a paster showing the name of the deceased, place of death, cause of death, and the point to which they are to be shipped.

"SEC. 25. Bodies or remains of persons who have died with contagious, infectious, or communicable diseases may be exhumed after a period of five years shall have elapsed: *Provided*, That such remains shall be immersed in a solution of at least 50 per cent strength of carbolic acid or other equally efficient disinfectant for a period of one week, and afterwards placed in a metal-lined coffin or casket, to be hermetically sealed, and such coffin shall be inclosed in a strong outer box made of good strong lumber and not less than 1 inch thick, all joints ploughed, grooved, and glued; the top and bottom to be put on with cleats and crosspieces, and all parts put together with screws. All joints of said box shall be tightly closed with pitch or white lead, and a rubber band placed on the upper edge, between the lid and the box, and strong handles placed on each side and end of said outer box.

"SEC. 26. No body or remains shall be shipped by sea, except under such conditions and regulations as may be prescribed by the United States Public Health and Marine-Hospital Service. Upon the outside box containing the body or remains of a deceased person intended for shipment by sea shall be securely tacked a statement showing the name, age, nationality of the deceased person, the cause of death, and the destination of the remains. Copy of this statement shall be supplied to the chief quarantine officer of the Philippine Islands, or to his authorized representative, and all regulations governing the shipment of bodies or remains of deceased persons shall be fully complied with.

"SEC. 27. The placing of the body of any deceased person in an unsealed, overground tomb is prohibited unless the coffin or casket containing the remains shall be permanently and hermetically sealed in a metal case.

"This provision shall not apply to tombs and vaults which are strictly receiving vaults for bodies or remains awaiting shipment from the Philippine Islands or awaiting final disposition.

"SEC. 28. It shall be the duty of each local board of health to keep and maintain a full and complete record of deaths, and it may require such reports as it may deem advisable.

"SEC. 29. All morgues, undertaking establishments, receiving vaults, and places for embalming the dead, and all burial grounds or cemeteries, crematories or other

places for the disposition of the dead, shall be subject at all hours to such inspection as the local health authorities or the board of health for the Philippine Islands may deem advisable; and such institutions or establishments, whether public or private, shall be governed by duly approved sanitary regulations of the local boards of health.

"SEC. 30. Except in cases of emergency, any person who shall bury or inter, or cause to be buried or interred, a dead body of any human being, or any human remains, in any place except in a burial ground or cemetery, now or hereafter lawfully existing, shall, upon conviction, be punished according to the law.

"SEC. 31. Any person who wantonly or maliciously defaces, breaks, or destroys any tomb, ornament, or gravestone erected to any deceased person, or any memento, or memorial, or any plant, tree, or shrub pertaining to places of burial of a human being, or who shall wantonly or maliciously remove any fence, post, or wall of any burial ground or cemetery, shall, upon conviction, be punished as the law may prescribe.

"SEC. 32. The duty of burying the body of a deceased person devolves upon the persons hereinafter specified:

"1. If the deceased was a married man or woman, the duty of burial devolves upon the surviving spouse, if he or she possesses sufficient means to pay the necessary expenses.

"2. If the deceased was an unmarried man or woman, or a child, and left any kin, the duty of burial devolves upon the nearest of kin of the deceased, being adults, and within the Philippine Islands, and in possession of sufficient means to defray the necessary expenses.

"3. If the deceased left no spouse or kindred possessed of sufficient means to defray the necessary expenses, as provided in the two foregoing numbers, the duty of burial devolves upon the public authorities.

"Nothing herein contained shall change the liability of the estate of the deceased for the ultimate payment of expenses, the purpose and intent of this section being to fix the immediate duty of burial, and without respect to the ultimate liability of expense thereof.

"SEC. 33. Any person upon whom the immediate duty of burial of a deceased person is imposed by law, who omits to perform that duty within forty-eight hours after death, having ability to do so, shall, upon conviction, be punished according to law.

"SEC. 34. Any person charged by law with the duty of burying the body of a deceased person is entitled to the custody of such body for the purpose of burying it, except that in cases in which an inquest is required by law for the purpose of determining the cause of death, and in case of death with infectious, contagious, or communicable diseases, when such bodies shall remain in the custody of the local board of health, if there be one, or if there be no local board of health, in the custody of the municipal council.

"SEC. 35. Except in times of epidemics, or in cases of death due to contagious, infectious, or communicable diseases, the right to hold public funerals and to take the remains of deceased persons into churches or other places for this purpose shall not be abridged or interfered with: *Provided*, That such remains shall have been properly disinfected and inclosed in a substantial coffin of wood or metal, so as to prevent the escape of offensive gas or odors: *And provided further*, That such funeral shall be conducted in an orderly manner. In cases of epidemic, recognized by the board of health for the Philippine Islands, and in cases of death due to contagious, infectious, or communicable diseases, the bodies of such deceased persons shall not be taken to places of public assembly, nor any person permitted to attend the funeral of such body, except the adult members of the immediate family of the deceased, his nearest friends, not exceeding four, and other persons whose attendance is absolutely necessary. After the deceased shall have been buried for a period of one hour, a public funeral may be held at the grave, or in a place of public assembly.

"SEC. 36. Nothing in this act shall operate to interfere with the military authorities of the United States in transporting the bodies or remains of officers, soldiers, sailors, or civilian employees in the Army or Navy, or other public service of the United States, or of their families, under acts of Congress: *Provided*, That death was not due to cholera, bubonic plague, smallpox, yellow fever, or other such diseases as the board of health for the Philippine Islands may designate, in which case two years shall elapse before disinterment, unless the bodies were cremated before burial; or to interfere with the transit of bodies of officers, soldiers, sailors, or civilian employees of the Army, Navy, or other public service of the United States, or of their families, from places of death, in charge of the military authorities to the authorized burial places or embalming places, or other place or morgue.

"SEC. 37. Subject to the approval of the secretary of the interior, the board of health for the Philippine Islands may make such rules and regulations, not inconsistent with law, as it may deem necessary for the purpose of carrying into effect the provisions of this act, or for the purpose of meeting contingencies or emergencies as they arise, and upon any question affecting the maintenance of public health, and the suppression and extermination of contagious epidemics and diseases, and the rules and regulations thus made and approved shall have the force and effect of law: *Provided*, That in the jurisdiction of the Moro Province such rules and regulations shall be made and submitted to the secretary of the interior by the governor of the Moro Province.

"SEC. 38. Any person violating the provisions of this act or any part thereof, shall, upon conviction, be fined not to exceed ₱200 Philippine currency or six months in jail, or both, in the discretion of the court.

"SEC. 39. All laws and ordinances or parts thereof in conflict with this act are hereby repealed.

"SEC. 40. The public good requiring the speedy ecactment of this bill, the passage of the same is hereby expedited in accordance with section 2 of 'An act prescribing the order of procedure by the commission in the enactment of laws,' passed September 26, 1900.

"SEC. 41. This act shall take effect on its passage."

MINERO-MEDICINAL WATERS OF THE PHILIPPINE ISLANDS.

Act 157, providing for the establishment of a board of health for the Philippine Islands and fixing its duties, makes it incumbent on the said board to make inquiry and investigation into the causes, pathology, and means of preventing diseases, especially epidemic diseases, including those of domestic animals, together with the sources of mortality and the effects of localities, employments, conditions, habits, foods, beverages, and medicines on the health of the people, and into the chemical composition of minero-medicinal waters of the Philippine Islands.

Many samples of "marvelous" waters have been examined by the chemical laboratory at the request of this bureau with the result that faith cure has been determined to be the chief healing principle in each, except in the case of waters from Sibul Springs, Los Baños, the several springs in the province of Ambos Camarines, and the province of Sorsogón.

The results of the investigation into the medical properties of these waters are on file in the records of the bureau and will be published when the series of investigations are complete.

HEALTH RESORTS.

At Baguio, Benguet Province, only about 130 miles from Manila, at an elevation of about 6,000 feet above the sea level, the government has established a sanitarium. The place has been made easily accessible by the completion of the Benguet road.

This resort has a temperate climate, good air, and good water, and will become the mecca for all Americans in the Philippines as soon as it is made more readily accessible by railroad connection, which the Benguet highway just finished has made feasible and probable.

The establishment of a sanitarium at the health resort of Sibul Springs, in Bulacán Province, is under negotiations.

Los Baños, a few hours' ride from Manila by river steamer, is justly celebrated for the minero-medical character of its water. A general sanitarium is maintained at this place by private enterprise.

Those who need or prefer to take vacations outside of the islands may visit at moderate expense China, Japan, Java, the Strait Settlements, or even India.

So far as the American civil employees are concerned, the Benguet highway has almost solved the problem involved in their living beyond the limits of their proper racial zone and the particular environments thought to be essential to the health and happiness of this race.

With the constantly improving conditions of life in the Philippines, Americans and Europeans may look forward to the average expectancy of health and life.

With the advent of the "era of railroad building" the number of health resorts will multiply. There are many places in the islands that may justly be classed as such as soon as their advantages are made available by transportation facilities.

LABORATORY.

In discussing the question of laboratories in the Philippine Islands I shall take the liberty to draw freely from a paper entitled "Evolution of the medical laboratory

work in the Philippine Islands and opportunities now offered for future work," by the able director of the biological laboratory, Dr. Richard P. Strong.

The history of scientific laboratories, and indeed of all laboratory work in these islands, relates entirely to very recent times. The earliest record of the establishment in Manila of what might be called a laboratory was about in 1883. It seems almost certain that as late as 1881 there was no laboratory in these islands. At this time specimens of medico-legal importance were occasionally submitted by the courts to the principal druggist for examination. During the year 1881, in connection with a medico-legal case, the question arose as to whether a rather fresh stain upon a certain fabric was blood or some other substance, and an undisputed opinion could not be obtained upon it. This incident alone would seem to demonstrate that no proper laboratory existed at this time. About the latter part of the year 1882 three physicians of Manila, Dr. J. M. Donelan, an Irishman; Dr. Rufino Martini, a Spaniard, and Doctor Parmentier, a Frenchman, became convinced of the necessity of a proper medical laboratory in this city. These gentlemen visited Don Anacleto del Rosario y Sales, a druggist, and begged him to take up this matter, with the result that he established shortly after, in 1883, in his drug store, a laboratory, which undertook particularly the microscopic examinations of specimens of sputum and of urine submitted by the various physicians of the city. It was in this laboratory that the bacillus of tuberculosis was for the first time in Manila shown and demonstrated under the microscope. A short time after, during the cholera epidemic which raged in these islands, the morphology of the cholera spirillum was also here demonstrated to several physicians.

In the Biblioteca Filipina, compiled by Commissioner Tavera, may be found a note taken from the proceedings of the chamber of commerce and which may be translated as follows:

"Don Anacleto del Rosario y Sales, a mestizo born in Manila, by virtue of his own efforts and work gained renown as a chemist and microscopist greatly to be envied. Chemical analysis was his favorite science, and in his investigations in this branch he gained renewed laurels. He was a member of the faculty of pharmacy in the University of Manila, director of the municipal laboratory, and died in Manila in 1895, loved and respected by all."

The first Spanish Government laboratory was apparently established in Manila in 1887 and 1888. During the latter year the municipal laboratory was opened, which was located first on Calle San Jacinto and later on in the present ayuntamiento, and which undertook to perform chemical examinations of foods, liquors, waters, and other analyses for the sanitary department.

In July, 1894, the Government found it advisable to establish another laboratory for the performance of examinations in connection with medico-legal questions. This laboratory was situated on Calle Palacio, and Dr. Mariano García del Rey became its director. It was also supposed to perform clinical laboratory work for private physicians. After Rosario's death Dr. Antonio Casanova succeeded to the position of director of the municipal laboratory and Dr. Antonio Luna to that of professor of chemistry in this institution. Both of these laboratories were mainly employed in the performance of analyses desired by the Government.

As in Cuba and Porto Rico after American occupation, the early efforts to establish laboratories here were made by the Army. It was at the hospital now known as the First Reserve, and which became the largest American military hospital in Manila, that the first attempt was made to establish a laboratory in 1898, by Captain McVay, of the Medical Corps. Unfortunately, about two months after he began this work, Doctor McVay sickened with typhoid fever, to which he succumbed. After his death apparently no effort was made to continue this work at the hospital. At any rate, upon Doctor Strong's arrival here several months later (February, 1899), he found the building in which this work had been carried on closed. The room used for the laboratory contained an incubator and a number of tubes of culture media. The other equipment, including the microscope, had been returned to the medical supply depot. He also found Doctor McVay's notebook, which contained records of a number of blood examinations for malaria and serum reactions for typhoid fever. To Doctor McVay belongs the credit of having performed the first medical laboratory work in the hospitals here after American occupation.

Owing to the generosity of Surgeon-General Sternberg, who was ever ready to further any scientific work in the Army, Doctor Strong was supplied with a microscope and a very fair equipment for a small clinico-pathologic laboratory. With this equipment he was able, after a brief service in the field, to set up in a building in connection with the First Reserve Hospital. The house in question contained four rooms upstairs, three of which were used for laboratory work. On the ground floor were rooms which were used for animals. Work tables were put in, culture media were prepared, and incubators set up and regular clinico-pathological laboratory examinations were begun.

Thus was established the first American medical laboratory in Manila.

On July 1, 1901, the United States Philippine Commission, by authority of the President of the United States, passed an act establishing the present bureau of government laboratories and provided for a biological laboratory, a chemical laboratory, and a laboratory for the production of vaccine virus and of serums and prophylactics, and also for the establishment of a reference library. Under this act Dr. Paul C. Freer was appointed director of the chemical laboratory and superintendent of the bureau, and Doctor Strong became the director of the biological laboratory. Doctor Jobling was later appointed director of the serum laboratory, and upon his departure from these islands in July, 1904, Doctor Woolley succeeded him in this position.

The bureau of government laboratories will be glad to receive as guests trained workers who wish to pursue laboratory studies in these islands. It will provide them with laboratory space and with proper apparatus and chemicals, and also the necessary animals for research work. In return it merely asks the privilege of publishing the results of the experiments in one of its own bulletins. The writer may also publish his article elsewhere if he so wishes.

THE RELATION OF CLIMATE AND HEALTH, WITH SPECIAL REFERENCE TO AMERICAN CIVIL-SERVICE EMPLOYEES.

In my last annual report I presented a table of statistics made up from the sick report of the various bureaus, showing that the second year of residence in the Tropics is the critical period for American employees, and called attention to the special value of the statistics of the civil-service board, which at that time had not been published.

Dr. William S. Washburn, chairman of the Philippine civil-service board, read before the Philippine Islands Medical Association at its recent meeting a very carefully prepared paper entitled "The Relation of Climate and Health, with Special Reference to American Occupation of the Philippine Islands."

Doctor Washburn has studied the subject from the standpoint of the climatologist, and his scholarly paper, in my opinion, should be published in pamphlet form by the government and a copy mailed to each applicant in the United States for a position in the Philippine civil service.

Doctor Washburn said, in part:

"In the classification of climates, based on the size and extent of masses of land, oceanic, insular, and continental, the climate of the Philippine Islands is largely that of the first two classes, oceanic and insular. Nowhere is the land distant from the seacoast more than 60 miles. The moderating influences of the great bodies of sea water are therefore operative. On account of climatic influences, the climate of the Philippines is widely different from those of tropical Africa, South America, and Asia, in the same latitude. As a rule, the smaller the island the more equable the climate throughout the day and the year. The climate of the greater part of the Philippine Archipelago is, for this reason, comfortable and hygienically favorable for the treatment of many diseases. In the temperate zone, an insular, mild, or equable climate is frequently a health resort.

"Observations of the Manila Observatory show that while the temperature as indicated by the thermometer at sea level is practically the same throughout the Philippine Archipelago, it is higher in some regions than in others during the months of April, May, and June, which cover the period of greatest heat.

"During this hot season there is a mean temperature of about 87° in the northern part of the island of Panay and throughout the island of Luzón, except the highlands, and a portion of the provinces of Pampanga, Bulacán, Rizal, and Bataán.

"During this period there is a mean temperature of about 83° in the parts of Luzón excepted above, including Manila, and the islands of Romblón and Cebú, the peninsula of Zamboanga, and the west coasts of Sámar, Negros, Panay, and Bohol.

"A comparatively mild mean temperature of about 80° prevails during this period over the Sulu Archipelago, the extreme southeast of Luzón, and the eastern portions of those islands south of Luzón and contiguous to the Pacific Ocean, viz, Sámar, Leyte, and Mindanao. If the readings of the thermometer for the elevated regions were included these averages would be very considerably reduced.

"Except for the months of April, May, and June, in the first and second regions named above, the mean temperature for the remaining part of the year at or near the sea level is about 80°. The observations of the Manila Weather Bureau show that the annual variation of temperature is greater in the northern than in the southern part of the archipelago.

"Some portions of the Philippine Islands are characterized by a rainy season and a dry season, the rainy season gradually beginning in June, being excessive usually

in July, August, and September, and gradually decreasing to November, while in other parts of the archipelago there is a more even distribution of rain. Parts of the eastern coast of northern Luzón and the interior of Luzón above 4,000 feet, the Pacific Ocean side of the archipelago, including the eastern portions of the islands of Masbate, Panay, and Bohol, are subject to the heaviest rainfalls, amounting to over 100 inches annually. In the other parts of the archipelago, including Manila, the mean annual rainfall is less than 100 inches, decreasing to about 35 inches at Zamboanga.

"The geological formation of the Philippine Islands is of volcanic origin, and in places of moderate elevation the earth covered by cultivable soil is not unhealthful.

"The observations of the Manila Weather Bureau show a considerable difference in climate between the coastal regions of the islands of Luzón and Mindanao. Mountain climate in these two islands is similar to that of Baguio, Luzón, whose altitude is 4,777 feet and whose average temperature and humidity are relatively low during the hot months of March, April, May, and June, owing to the prevailing winds blowing from the China Sea during that season. The climate of this region is ideal from November to June. The region consists of a rolling table land well watered. The forests are of pine and the soil productive. The vegetation is similar to that of the temperate zone.

"Notwithstanding the climate of the Philippines is commonly referred to as enervating, Americans connected with the public service, whether engaged upon work in offices or upon work requiring their presence in the open air, have probably on the average accomplished more in the islands than is ordinarily accomplished at home in similar lines of work. Regular habits, the leading of a temperate life, and the absence of indulgence in excesses, have much to do with one's health in any country. The climate of these islands should not be held responsible for illness or physical breakdown due to those excesses which tend to physical demoralization in the temperate zone. Absence from home environment and restraints probably accounts for a large number of Americans who, by plunging into excesses of various kinds, caused their own physical demoralization and failure.

"It should be remembered that there is no place even in the temperate zone suitable for and agreeable to all persons. There are so great a variety and so many degrees of physical obliquity that no single combination of climatic influence, however favorable, can be found to meet all conditions. Because the climate of the Philippine Islands does not agree with some who even take reasonable care of themselves does not necessarily indicate that the climate is unhealthful. The physical condition of many improves after coming to the islands and that of others remains normal.

"As a general rule, the appearance of Europeans living in the Tropics seems to indicate an anemic condition. The 'cry of the system for better blood,' expressed in the form of neuralgia, is, however, rare.

"In this connection Cabot states: 'The most striking example of the fallacy of judging of anæmia by the color of the skin and mucous membranes is the so-called "tropical anæmia." Practically all persons belonging to white races who take up their abode in the Tropics acquire after a term of years an extreme pallor of the skin and mucous membranes, and this appearance has usually received the title of "tropical anæmia." It turns out, however, from the careful studies of several different investigators, that the blood of such persons shows absolutely no anæmia or other variation from the normal. The appearance of the skin is probably due to the action on the peripheral nerves and vessels. Tropical anæmia is a condition not of the blood, but of the skin and subcutaneous tissues. These views are confirmed by the more recent studies of Phden, Marestang, Gringus, and Eijkmann. Gottstein concludes that as a result of long residence in the Tropics * * * neither a quantitative change of the blood nor a reduction in the number of its cells or its hemoglobin content takes place.'

"Cantlie observes that about two years are required for acclimation of the white man in the Tropics, after which good health is a reasonable expectation. Calvert makes a similar observation. These views seem to be borne out by statistics of the board of health for the Philippine Islands, which show the general average of sick days per year for five years for each American employee connected with the civil service of the Philippine government, as follows: First year, 4.80; second year, 7.63; third year, 4.47; fourth year, 0.81; fifth year, 0.83. Further corroboration is found in the following, reported by Marston, showing the death rate of British white troops in India per thousand, based upon statistics for a period of eight years prior to and including 1884: First and second years of service, 6; third to sixth years of service, inclusive, 1.88; seventh to tenth years of service, inclusive, 0.73.

"The period of foreign service of the United States Army being two or three years, appears to cover practically the usual period of acclimation. The conclusion appears

to be reasonable that the fourth and fifth years of residence in the Philippines are more agreeable from the standpoint of health than any of the preceding years, as is indicated by the board of health statistics, a large proportion of the personnel of the Philippine civil service having been recruited from officers and enlisted men of the volunteer establishment of the Army. The views expressed by the president of this medical association, Doctor McDill, in annual address, are in accord with conclusions reached by other observers.

"The influence of the climate of the Philippines, from a surgical point of view, is clearly expressed by Maj. J. M. Banister, of the Medical Corps of the Army, in the following propositions:

"'1. Aseptic results will just as surely follow aseptic methods in the Philippines as in the United States or Europe.

"'2. Should septic infection occur in any clean case subjected to operation in the Philippines, blame the technique, not the climate.

"'3. Successful attainment of the object for which the operation has been undertaken will follow careful and skillful surgery in the Philippines with the same regularity that we have been accustomed to observe in such work at home.

"'4. Convalescence after surgical operations in the Philippines is rapid and satisfactory when such operations have been carefully and skillfully performed.

"'5. The danger of mortality after a skillfully performed surgical operation in which all the details of a rigid aseptic technique have been carried out is not increased by the influences of the climate of the Philippines unless the patient is at the same time the victim of some other serious disease.'

"Similar views are expressed by the attending physician and surgeon, Civil Hospital, in his report, submitted in 1903, to the secretary of the interior.

"Major-General Wood, governor of the Moro Province, in his annual report to the governor-general, states: 'There is nothing in the climate in this portion of the islands which prohibits a long residence here. The British residents of North Borneo and the Malay Peninsula and the Dutch in Java manage to live apparently very contented and healthy lives in these countries, which are hotter than any portion of the Philippine Islands. While the service is in a way severe, it does not seem to deter the average Englishman or Dutchman from competing eagerly for positions in the government of the colonies, and it is believed that Americans can live and do good work where any other white race can. A moral life, with plenty of hard work, will be found to counteract in most cases the so-called demoralizing effects of the Philippine climate.'

"The revelations of bacteriologic research of the last few years, arming men with knowledge of the causative factors of many tropical diseases, have diminished the importance of their geographic and meteorologic relations, have destroyed theories of the climatic origin of disease, and thereby robbed the tropical region of many of its terrors, such as yellow fever, malaria, Asiatic cholera, and dysentery. Among Americans the late lamented Maj. Walter Reed and his coadjutors did monumental work along this line in Cuba and the army laboratory at Washington. The preliminary work of the bacteriologists and pathologists connected with this magnificent and splendidly equipped new laboratory in the Far East gives every indication that the research work already inaugurated will show brilliant results and add new names to the long list of investigators whose work and discoveries in the field of preventive medicine deserve the gratitude of the whole world.

"CONCLUSIONS.

"(1) With respect to the principal climatologic factors—temperature, humidity, and atmospheric movements—the climate of the Philippine Archipelago is not extreme, and occupies an intermediate place in tropical climates, as it is distinctly insular in character, the greater portion of the land area being not far distant from the ocean. There are other modifying influences which obtain in portions of the archipelago, such as general oceanic and local interisland currents, prevailing winds, elevation, the state of cultivation and drainage of the soil, and the presence of forests and other plant life.

"(2) Excluding localities in the Tropics characterized by excessive heat, high relative humidity, or unhealthful soil conditions, acclimation or physiologic adaptation of the white man to tropical enviroment is possible.

"(3) If acclimation is possible, colonization is possible.

"(4) Failures of the white race to live in the Tropics and maintain health, excluding localities indicated in the second conclusion, appear to have been due principally to nonobservance of the rules of personal, domestic, and public hygiene.

"(5) As a rule, Americans appear to become acclimated in the Philippines during the third year of residence.

"(6) With sanitary surroundings, and by observing the rules of personal and domestic hygiene, residence of Americans in the Philippine Islands appears to be attended with as little danger of disease and death as residence in the United States under similar sanitary conditions."

SANITARY LAWS.

The special acts recommended by the board of health may be found under the subjects to which they pertain, with the exception of the proposed sanitary code for Manila, which is submitted as an appendix.

SUGGESTIONS AND RECOMMENDATIONS.

The following suggestions and recommendations are made:

It is hoped that the work of dredging the esteros and cleaning them will be continued. As very few, if any, latrines empty into the esteros, there is not so much foul odor arising from them as formerly, still they are a disgrace to the city, and should be cleaned and deepened.

Notwithstanding the fact that every effort has been made in the way of the disinfection and tearing down when necessary of houses infected with plague, and that a number of rat catchers have been kept busy, a few cases of plague occur from time to time in Manila. It is hoped that the efforts to dislodge this disease will be kept up and in the end be successful. A few cases of plague have appeared in Cebú, and the statement was received that rats had been found dead at various places within the city limits. So far the disease has not reached formidable proportions in that city, and care should be taken to keep the disease under control.

The question of establishing the same form of city government in Cebú as in Manila has been raised. It is possible that if Cebú had a charter, chief of police, and a municipal judge, sanitary matters might be handled there in a more satisfactory manner.

When possible, all the insane in the Hospicio de San José should be removed to the insane asylum and the hospicio turned into an orphan asylum.

It is again recommended that American or European prisoners who are condemned to serve a longer term than two years should not be kept in Bilibid Prison, but should either be sent to some prison in the United States or to some place in the neighborhood of Baguio. This recommendation is based solely on sanitary grounds.

In obedience to orders of superior authority, the commissioner of public health is about to proceed to a post of duty at a distance from the Philippine Islands. Before laying down his office here he desires to express, in a few simple words, his thanks to the members of the Philippine Commission, especially to the governor-general, for the kindness and consideration he has received at their hands.

The courtesy which has been shown him by his official superiors has been grateful to him, and has gone far toward making tolerable what at times seemed an almost intolerable position.

Of the men who have worked with him, under his immediate supervision and observation, the commissioner of public health can find no words adequate to express his appreciation.

To them are due the results accomplished, the benefits obtained, and the gratitude of their chief. They may rest assured that his gratitude is profound, his appreciation of their work and loyalty sincere, and his regret at parting with them genuine.

Respectfully submitted.

E. C. CARTER,
Major and Surgeon, U. S. Army,
Commissioner of Public Health.

The GOVERNOR-GENERAL,
(Through the secretary of the interior),
Manili, P. I.

STATISTICAL TABLES.

VITAL STATISTICS, FROM SEPTEMBER 1, 1904 TO AUGUST 31, 1905.

Population of Manila (official census of 1903).

Nationality.	Population.
Americans	4,379
Filipinos	189,782
Spaniards	2,528
Other Europeans	1,117
Chinese	21,220
All others	895
Total	219,941

Births reported from September 1, 1904, to August 31, 1905.[1]

Race.	Male.	Female.	Total.	Birth rate per 1,000
Americans	57	54	111	25.29
Filipinos	3,997	3,566	7,563	39.85
Spaniards	25	28	53	20.96
Other Europeans	12	8	20	17.90
Chinese	21	6	27	1.27
All others	4	1	5	5.56
Total and average	4,116	3,663	7,779	35.36

[1] Incomplete.

Births, by districts, from September 1, 1904, to August 31, 1905.

Health districts.	Number of legitimates.			Number of illegitimates.			Grand total.
	Male.	Female.	Total.	Male.	Female.	Total.	
No. 1, San Nicolás	343	260	603	51	39	90	693
No. 2, Tondo	617	591	1,208	125	123	248	1,456
No. 3, Quiapo	499	452	951	71	65	136	1,087
No. 4, Santa Cruz	807	732	1,539	96	86	182	1,721
No. 5, Sampaloc	443	415	858	96	78	174	1,032
No. 6, Intramuros	197	141	338	10	8	18	356
No. 7, Ermita, etc	837	715	1,552	42	43	85	1,637
Total	3,743	3,306	7,046	373	360	733	7,779

Deaths, by race, occurring among residents, and city death rate per thousand, from September 1, 1904, to August 31, 1905.

Race.	Deaths.	Annual average per thousand.
Americans	39	8.86
Filipinos	8,453	44.54
Spaniards	51	20.17
Other Europeans	14	12.53
Chinese	343	16.15
All others	26	29.05
Total and average	8,926	40.58

Classified report, by sex and condition, of all deaths occurring in residents and transients in Manila from September 1, 1904, to August 31, 1905.

Male.	Number.	Female.	Number.
Married	969	Married	664
Widowers	309	Widows	506
Single	960	Single	262
Boys	3,200	Girls	2,711
Condition not stated	117	Condition not stated	33
Total	5,555	Total	4,176
		Grand total	9,731

Stillbirths	300
Number of deaths with medical attendance	5,319
Number of deaths without medical attendance	4,412
Total	9,731

Deaths, by age, including transients.

Age.	Number.	Age.	Number.
Under 30 days	1,039	40 years to 50 years	502
30 days to 1 year	3,637	50 years to 60 years	396
1 year to 2 years	637	60 years to 70 years	309
2 years to 5 years	470	70 years to 80 years	189
5 years to 10 years	140	80 years to 90 years	105
10 years to 15 years	105	90 years to 100 years	53
15 years to 20 years	345	Over 100 years	16
20 years to 25 years	443	Unknown	29
25 years to 30 years	579		
30 years to 40 years	737	Total	9,731

Deaths, by districts, including transients.

Health districts.	Population.	Deaths.	Annual rate per 1,000.
No. 1, San Nicolás	53,573	844	15.75
No. 2, Tondo	39,045	2,625	67.28
No. 3, Quiapo	18,487	860	46.51
No. 4, Santa Cruz	43,040	2,248	52.23
No. 5, Sampaloc	20,279	1,077	53.10
No. 6, Intramuros	17,463	553	31.66
No. 7, Ermita, Paco, etc	28,054	1,524	54.32
Total and average	219,941	9,731	44.24

Comparative mortality from January 1, 1901, to August 31, 1905.

Months.	1901.		1902.		1903.		1904.		1905.	
	Number of deaths.	Annual death rate per 1,000.[a]	Number of deaths.	Annual death rate per 1,000.[a]	Number of deaths.	Annual death rate per 1,000.	Number of deaths.	Annual death rate per 1,000.[b]	Number of deaths.	Annual death rate per 1,000.[b]
January	753	36.25	760	36.58	602	[a] 28.98	796	42.64	685	36.69
February	689	36.72	706	37.63	511	[a] 27.23	709	40.59	608	36.05
March	885	42.66	770	37.06	539	[a] 25.94	751	40.23	563	30.15
April	896	44.07	1,327	66.01	549	[a] 27.31	748	41.40	530	29.32
May	903	43.47	1,688	81.26	770	[a] 37.06	766	41.03	526	28.16
June	621	30.89	1,418	70.54	592	[a] 29.45	800	44.28	593	32.81
July	608	29.27	2,223	107.02	620	[b] 33.21	866	46.39	747	40.00
August	702	33.79	1,712	82.42	862	[b] 46.17	1,032	55.28	841	45.03
September	767	38.15	1,132	56.31	1,228	[b] 67.97	1,064	58.89	.....	.....
October	855	41.16	927	44.62	1,217	[b] 65.19	1,018	54.53	.....	.....
November	848	42.18	1,035	51.48	974	[b] 53.91	957	52.97	.....	.....
December	858	41.30	753	36.25	894	[b] 47.89	794	42.53	.....	.....

[a] Death rate computed on population of 244,732 (health department's census).
[b] Death rate computed on population of 219,941 (official census, 1903).

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[a] Death rate computed on population of 244,782 (health department's census).
[b] Death rate computed on population of 219,941 (official census, 1903).

Number of deaths, with causes, occurring among residents in Manila from September 1, 1904, to August 31, 1905.

[Stillbirths not included.]

	Cause of death	Americans.		Foreigners.		Filipinos.		Chinese.		Total.
		Male.	Female.	Male.	Female.	Male.	Female.	Male.	Female.	
	I.—General diseases.									
1	Typhoid fever (abdominal typhus)	1		5	1	59	51	4	1	122
4	Intermittent fever and malarial cachexia	2		2		64	35	7		110
4a	Malarial cachexia					11	3	4		18
5	Smallpox	1				3	2			6
6	Measles					1				1
7	Scarlet fever					1				1
8	Whooping cough					5	3			8
9	Diphtheria and croup					5				5
9a	Diphtheria						1			1
10	Influenza					8	3			11
12	Asiatic cholera	1	1	4		27	10	1		44
13	Cholera nostras					1				1
14	Dysentery	2	1	2	1	179	81	47		313
15	Bubonic plague	1				15	14	9		39
17	Leprosy					31	24			55
18	Erysipelas					5	4			9
19	Other epidemic diseases			2		127	113	48	1	291
20	Purulent infection and septicemia					7	6			13
21	Glanders and farcy					1				1
22	Malignant pustule					2	1			3
26	Tuberculosis of the larynx					31	27	1		59
27	Tuberculosis of the lungs			7		504	369	85	1	971
28	Tuberculosis of the meninges					15	14			31
29	Abdominal tuberculosis					21	22	1		45
30	Pott's disease					1	1			2
31	Cold abscess and abscess by congestion					1				1
33	Tuberculosis of other organs					3	3			6
34	General tuberculosis					11	5		1	17
35	Scrofula					5	4			9
36	Syphilis					1	1	9		11
38	Gonorrhea (under 5 years)						1			1
39	Cancer and other malignant tumors of the buccal cavity					2	2			4
40	Cancer and other malignant tumors of the stomach and liver					1				1
41	Cancer and other malignant tumors of the peritoneum, intestines, and rectum					1				1
42	Cancer and other malignant tumors of the female genital organs						8			8
43	Cancer and other malignant tumors of the breast				1		2			3
45	Cancer and other malignant tumors of other organs or of organs not specified					11	8			19
46	Other tumors (tumors of the female genital organs excepted)					1				1
47	Acute articular rheumatism					10	5			15
48	Chronic rheumatism and gout					31	32			63
50	Diabetes		1		1	3	2			7
53	Leukemia						2			2
54	Anemia, chlorosis			2	1	9	18		1	30
55	Other general diseases		1			1				2
56	Acute and chronic alcoholism	2								2
59	Other chronic poisonings							1		1
	II.—Diseases of the nervous system and of the organs of special sense.									
60	Ecephalitis			1		4				5
61	Simple meningitis			2	1	198	168			369
62	Progressive locomotor ataxia			1		1	1			3
63	Other diseases of the spinal cord					2	1			3
64	Congestion and hemorrhage of the brain			2	1	53	46	3		105
65	Softening of the brain					2	5			7
66	Paralysis without specified cause					2	2	1		5
67	General paralysis					6	12	1		19
68	Other forms of mental alienation							6		6
69	Epilepsy					3	2			5

***Number of deaths, with causes,** occurring among residents in Manila from September 1, 1904, to August 31, 1905*—Continued.

	Cause of death.	Americans.		Foreigners.		Filipinos.		Chinese.		Total.
		Male.	Female.	Male.	Male	Male.	Female	Male	Female.	
	II.—*Diseases of the nervous system and of the organs of special sense*—Con.									
70	Convulsions (nonpuerperal, 5 years and over)						1			1
71	Convulsions (under 5 years)		1		1	1,438	1,188	4	4	2,636
72	Tetanus	1				54	32	1		88
73	Chorea					1				1
74	Other diseases of the nervous system					6	3			9
75	Diseases of the eye and its adnexa						2			2
76	Diseases of the ear						1			1
	III.—*Diseases of the circulatory system*									
77	Pericarditis					2	4			6
78	Acute endocarditis			2		11	10			23
79	Organic diseases of the heart	3		4	2	29	28	31	1	98
80	Angina pectoris			1		13	22			36
81	Diseases of the arteries, atheroma, aneurism, etc			1	1	6	6	1		15
82	Embolism and thrombosis					2	3			5
85	Hemorrhages						1			1
86	Other diseases of the circulatory system							1		1
	IV.—*Diseases of the respiratory system.*									
88	Diseases of the larynx				1	4	2			7
90	Acute bronchitis			1		201	185	1		388
91	Chronic bronchitis					213	176	13	1	403
92	Broncho-pneumonia	1			1	24	23			49
93	Pneumonia					46	19	2		67
94	Pleurisy					2	1			3
95	Congestion and apoplexy of the lungs				1	13	6	2		22
96	Gangrene of the lungs					1				1
97	Asthma					15	14	4		33
99	Other diseases of the respiratory system (phthisis excepted)					2	1			3
	V.—*Diseases of the digestive system.*									
100	Diseases of the mouth and its adnexa					2				2
101	Diseases of the pharynx					1	1			2
102	Diseases of the esophagus							5		5
103	Ulcer of the stomach			2		2	3			7
104	Other diseases of the stomach (cancer excepted)					17	14			31
105	Diarrhea and enteritis (under 2 years)	1	1	1	2	155	134	1	2	297
105a	Chronic diarrhea and enteritis (under 2 years)					166	136			302
106	Diarrhea and enteritis (2 years and over			7		148	187	1		343
107	Intestinal parasites					3	4			7
108	Hernia and intestinal obstructions					6	5	1		12
109	Other diseases of the intestines			1		2	1			4
110	Acute yellow atrophy of the liver			1		6		1		8
111	Hydatid tumors of the liver					1				1
112	Cirrhosis of the liver					11	6			17
113	Biliary calculi					2	2			4
114	Other diseases of the liver	2				3	6	1		12
115	Diseases of the spleen					1		1		2
116	Simple peritonitis (nonpuerperal)					12	9	2		23
117	Other diseases of the digestive system (cancer and tuberculosis excepted)					1				1
118	Appendicitis and abscess of the iliac fossa					2		1		3
	VI.—*Diseases of the genito-urinary system and its adnexa.*									
119	Acute nephritis			1	1	11	21	2		36
120	Bright's disease	1		2	1	39	37	5	1	86
121	Other diseases of the kidneys and their adnexa			1		2				3

Number of deaths, with causes, occurring among residents in Manila from September 1, 1904, to August 31, 1905—Continued.

	Cause of death.	Americans.		Foreigners.		Filipinos.		Chinese.		Total.
		Male.	Female.	Male.	Female.	Male.	Female.	Male.	Female.	
	VI.—*Diseases of the genito-urinary system and its adnexa*—Cont'd.									
123	Diseases of the bladder			1		2	1			4
127	Metritis						7			7
128	Uterine hemorrhage (nonpuerperal)						3			3
131	Cysts and other tumors of the ovary						1			1
	VII.—*The puerperal state.*									
134	Accidents of pregnancy						1			1
135	Puerperal hemorrhage						29		1	30
136	Other accidents of labor						3			3
137	Puerperal septicemia				1		48			49
138	Puerperal albuminuria and convulsions						9			9
139	Phlegmasia alba dolens (puerperal)						1		1	2
140	Other puerperal accidents—sudden death				1					1
	VIII.—*Diseases of the skin and cellular tissue.*									
143	Furuncle					2				2
144	Acute abscess, phlegmon					1	2			3
145	Other diseases of the skin and its adnexa			1		1	1			3
	IX.—*Diseases of the organs of locomotion.*									
146	Nontuberculous diseases of the bones					3	2			5
	X.—*Malformations.*									
150	Congenital malformations (stillbirths excepted)	1				7	4			12
	XI.—*Early infancy.*									
151	Congenital debility, icterus, and sclerema		1	1		217	177		2	398
152	Other diseases peculiar to early infancy			1		25	21			47
153	Lack of care	1				11	19			31
	XII.—*Old age*									
154	Senile debility				2	67	125	8		197
	XIII.—*External causes.*									
155	Suicide by poison			1						1
157	Suicide by hanging or strangulation					1	1			2
159	Suicide by firearms					1				1
160	Suicide by cutting instruments						1			1
164	Fractures					8	1	1		10
166	Other accidental traumatisms	7		1		17	8	2	1	36
167	Burns and scalds				1	6	4	4		14
171	Electric shock					3				3
172	Accidental drowning	1				13	1	3		18
173	Inanition (starvation)				1	2	2			5
175	Other acute poisonings	2		1		3	2			8
176	Other external violence					1	2	1		4
	XIV.—*Ill-defined diseases.*									
177	Dropsy					1				1
178	Sudden death					1				1
179	Causes of death unspecified or ill-defined	1		1		7	12			21
	Total	32	7	65	26	4,567	3,886	323	20	8,926
	Grand total	39		91		8,453		343		8,926

Deaths by race, sex, and age occurring among residents and transients from September 1, 1904, to August 31, 1905.

	Cause of death	Less than 1 day to 30 days.								From 30 days to 1 year.							
		American.		Foreign.		Filipino.		Chinese.		American.		Foreign.		Filipino.		Chinese.	
		Male.	Female.	Male.	Female.	Male.	Female.	Male.	Female.	Male.	Female.	Male.	Female.	Male.	Female.	Male	Female
	I.—*General diseases.*																
4	Intermittent fever and malarial cachexia									1				1	1		
4a	Malarial cachexia														1		
8	Whooping cough													2	1		
9	Diphtheria and croup													2			
10	Influenza													2	2		
14	Dysentery													7	1		
18	Erysipelas					2								2	1		
19	Other epidemic diseases													3	3		
27	Tuberculosis of the lungs					1								1			1
28	Tuberculosis of the meninges						1							9	7		
31	Cold abscess and abscess by congestion					1											
34	General tuberculosis													1			
35	Scrofula													1	1		
46	Other tumors (tumors of the female genital organs excepted)													1			
47	Acute articular rheumatism														1		
53	Leukemia						1										
54	Anemia, chlorosis				1										1		
	II.—*Diseases of the nervous system and of the organs of special sense.*																
60	Encephalitis													1			
61	Simple meningitis					6	2				1	2	1	117	93		
64	Congestion and hemorrhage of the brain					1								1	1		
71	Convulsions (under 5 years)					274	207	1	1		1		1	1,196	1,020	3	2
72	Tetanus	1				40	28										
74	Other diseases of the nervous system					3								1	3		
76	Diseases of the ear														1		
	III.—*Diseases of the circulatory system.*																
77	Pericarditis														1		
78	Acute endocarditis					1											
79	Organic diseases of the heart	1															
82	Embolism and thrombosis														1		
85	Hemorrhages						1										
	IV.—*Diseases of the respiratory system.*																
88	Diseases of the larynx					1									1		
90	Acute bronchitis					5	3					1		161	144	1	
91	Chronic bronchitis					1								156	118		
92	Broncho-pneumonia					2				1				11	12		
93	Pneumonia													6	3	1	
95	Congestion and apoplexy of the lungs					10	4								1		
	V.—*Diseases of the digestive system.*																
100	Diseases of the mouth and its adnexa													1			
104	Other diseases of the stomach (cancer excepted)													9	4		
105	Diarrhea and enteritis (under 2 years)				1	12	8		1	1	1	1	2	118	93	1	2
105a	Chronic diarrhea and enteritis (under 2 years)					5	3							87	74		

Deaths by race, sex, and age occurring among residents and transients from September 1, 1904, to August 31, 1905—Continued.

	Cause of death.	Less than 1 day to 30 days.								From 30 days to 1 year.							
		American.		Foreign.		Filipino.		Chinese.		American		Foreign		Filipino.		Chinese.	
		Male.	Female.	Male.	Female.	Male.	Female.	Male.	Female.	Male.	Female.	Male.	Female.	Male.	Female.	Male.	Female.
	V.—*Diseases of the digestive system*—Continued																
108	Hernia and intestinal obstructions													1	1		
114	Other diseases of the liver													1	1		
116	Simple peritonitis (nonpuerperal)					2	2							4	2		
	VI.—*Diseases of the genito-urinary system and its adnexa.*																
119	Acute nephritis													4	5		
120	Bright's disease													6			
	VIII.—*Diseases of the skin and cellular tissue.*																
145	Other diseases of the skin and its adnexa					1								1	1		
	IX.—*Diseases of the organs of locomotion.*																
146	Nontuberculous diseases of the bones													1	1		
	X. *Malformations.*																
150	Congenital malformations (still births excepted)	1				3	1							3	4		
	XI.—*Early infancy*																
151	Congenital debility, icterus, and sclerema					199	158		2			1	1	22	21		
152	Other diseases peculiar to early infancy					15	10							4	8		
153	Lack of care	1					2							10	13		
	XIII.—*External causes.*																
166	Other accidental traumatisms													1			
167	Burns and scalds													1			
173	Inanition (starvation)				1	1								1			
175	Other acute poisonings									1							
	XIV.—*Ill-defined diseases.*																
177	Dropsy													1			
179	Causes of death unspecified or ill-defined						2			1				2	2		
	Total	4		3		586	441	1	4	5	4	5	4	1,959	1,649	6	5
	Grand total	1		3		1,027		5		9		9		3,608		11	

Deaths by race, sex, and age occurring among residents and transients from September 1, 1904, to August 31, 1905—Continued.

	Cause of death.	From 1 year to 5 years.								From 5 years to 10 years.							
		American.		Foreign.		Filipino.		Chinese		American		Foreign.		Filipino.		Chinese.	
		Male.	Female.	Male.	Female.	Male.	Female.	Male.	Female.	Male	Female.	Male.	Female.	Male.	Female.	Male.	Female.
	I.—*General diseases.*																
1	Typhoid fever (abdominal typhus)				1	3	8		1					5	9		
4	Intermittent fever and malarial cachexia					6	7							8	8		
4a	Malarial cachexia					2	1										
5	Smallpox	1				2	1										
6	Measles					1											
7	Scarlet fever					1											
8	Whooping cough					5	2										
9	Diphtheria and croup					3									1		
9a	Diphtheria																
12	Asiatic cholera						1										
13	Cholera nostras					1											
14	Dysentery					52	44							15	8		
15	Bubonic plague						1								1		
18	Erysipelas						3										
19	Other epidemic diseases					6	10							3	3		
20	Purulent infection and septicemia					1	1										
26	Tuberculosis of the larynx					1	1										
27	Tuberculosis of the lungs					2	5							3	4		
28	Tuberculosis of the meninges			1	1	4	5								1		
29	Abdominal tuberculosis					10	2							1	4		
30	Pott's disease													1			
33	Tuberculosis of other organs					1											
34	General tuberculosis					2								2	1		
35	Scrofula					4	3										
38	Gonorrhea (under 5 years)						1										
45	Cancer and other malignant tumors of other organs or of organs not specified					1											
47	Acute articular rheumatism														1		
54	Anemia, chlorosis					2	1		1					1	2		
55	Other general diseases										1						
	II. *Diseases of the nervous system and of the organs of special sense.*																
61	Simple peritonitis				1	69	53					1		4	4		
64	Congestion and hemorrhage of the brain						1										
67	General paralysis														1		
69	Epilepsy					1	2										
70	Convulsions (nonpuerperal), 5 years and over														1		
71	Convulsions (under 5 years)					27	9		1								
72	Tetanus					1								4	1		
74	Other diseases of the nervous system					1									1		
75	Diseases of the eye and its adnexa						1										
	III.—*Diseases of the circulatory system.*																
77	Pericarditis														1		
78	Acute endocarditis											1					
80	Angina pectoris					1	1										
82	Embolism and thrombosis					1											
	IV.—*Diseases of the respiratory system.*																
88	Diseases of the larynx				1	2	1										
90	Acute bronchitis					42	35								1		
91	Chronic bronchitis					43	44							1	6		
92	Bronchopneumonia				1	10	5										
93	Pneumonia					1	2							1			
95	Congestion and apoplexy of the lungs				1									1			
97	Asthma					2									1		

Deaths by race, sex, and age occurring among residents and transients from September 1, 1904, to August 31, 1905—Continued.

	Cause of death	From 1 year to 5 years.								From 5 years to 10 years.							
		American.		Foreign.		Filipino.		Chinese.		American.		Foreign.		Filipino.		Chinese.	
		Male.	Female.	Male.	Female.	Male.	Female	Male.	Female.	Male.	Female.	Male.	Female.	Male.	Female.	Male.	Female.
	V.—*Diseases of the digestive system.*																
100	Diseases of the mouth and its adnexa					1	1										
103	Ulcer of the stomach					1											
104	Other diseases of the stomach (cancer excepted)					4	4										
105	Diarrhea and enteritis (under 2 years)					38	41										
105a	Chronic diarrhea and enteritis (under 2 years)					80	64										
106	Diarrhea and enteritis (2 years and over)					112	155							7	10		
107	Intestinal parasites					3	3							1	1		
108	Hernia and intestinal obstructions					1	1										
116	Simple peritonitis (nonpuerperal)					1		1									
	VI.—*Diseases of the genito-urinary system and its adnexa.*																
119	Acute nephritis					2	1								2		
120	Bright's disease					4								1	1		
	IX.—*Diseases of the organs of locomotion.*																
146	Nontuberculous diseases of the bones													1			
	X.—*Malformations.*																
150	Congenital malformations (stillbirths excepted)					1											
	XI.—*Early infancy*																
151	Congenital debility, icterus, and sclerema					1	1										
152	Other diseases peculiar to early infancy			1		5	2							1	1		
153	Lack of care					3	4										
	XIII.—*External causes.*																
167	Burns and scalds					1	3							1			
172	Accidental drowning					1	1							2			
173	Inanition (starvation)						2										
175	Other acute poisonings					1									1		
	XIV *Ill-defined diseases.*																
179	Causes of death unspecified or ill-defined													2	1		
	Total	1		2	6	569	525	1	3		1	2		66	72		
	Grand total	1		8		1,094		4		1		2		137			

Deaths by race, sex, and age occurring among residents and transients from September 1, 1904, to August 31, 1905—Continued.

	Cause of death.	From 10 years to 15 years.								From 15 years to 20 years.							
		American.		Foreign		Filipino.		Chinese.		American.		Foreign.		Filipino.		Chinese.	
		Male.	Female.	Male	Female.	Male.	Female.	Male.	Female.	Male.	Female.	Male.	Female.	Male.	Female.	Male.	Female.
	I.—*General diseases.*																
1	Typhoid fever (abdominal typhus)					7	6							19	14	1	
4	Intermittent fever and malarial cachexia					2	0							18	5	1	
4a	Malarial cachexia					3								1		1	
5	Smallpox													1			
10	Influenza					1								2			
12	Asiatic cholera					1	2					1		3	2		
14	Dysentery						2							7	4	1	
15	Bubonic plague					3	4							7	1	1	
17	Leprosy													5	5		
19	Other epidemic diseases					4	4							19	14	5	
20	Purulent infection and septicæmia					2	1							4	2		
26	Tuberculosis of the larynx						1							2	1		
27	Tuberculosis of the lungs					5	9					1		61	18		
29	Abdominal tuberculosis						1							3			
30	Pott's disease														1		
33	Tuberculosis of other organs														1		
34	General tuberculosis						1							1			
40	Cancer and other malignant tumors of the stomach and liver													1			
45	Cancer and other malignant tumors of other organs or of organs not specified						1							1			
47	Acute articular rheumatism													2	1		
48	Chronic rheumatism and gout													1			
50	Diabetes										1						
54	Anæmia, chlorosis					1									6		
55	Other general diseases						1										
	II.—*Diseases of the nervous system and of the organs of special sense*																
61	Simple peritonitis					2	4							4	1		
64	Congestion and hemorrhage of the brain													1	2		
67	General paralysis														1		
69	Epilepsy							1						1			
72	Tetanus					2								1			
	III.—*Diseases of the circulatory system*																
77	Pericarditis						1										
78	Acute endocarditis					1	1							3	1		
79	Organic diseases of the heart					2								5	2		
80	Angina pectoris						1							1	2		
82	Embolism and thrombosis													1			
	IV.—*Diseases of the respiratory system*																
91	Chronic bronchitis						1							2			
92	Broncho-pneumonia						1										
93	Pneumonia					1	3							13	1		
94	Pleurisy													1			
95	Congestion and apoplexy of the lungs														1		
97	Asthma					1									1		
	V.—*Diseases of the digestive system*																
106	Diarrhœa and enteritis (2 years and over)					1	1							5	4		
107	Intestinal parasites					1											
112	Cirrhosis of the liver					1								1			
114	Other diseases of the liver													1			
115	Diseases of the spleen					1											

***Deaths by race, sex, and age occurring among residents and transients from September 1, 1904, to August 31, 1905*—Continued.**

	Cause of death.	From 10 years to 15 years.								From 15 years to 20 years.							
		American.		Foreign.		Filipino.		Chinese.		American.		Foreign.		Filipino.		Chinese.	
		Male.	Female.	Male.	Female.	Male.	Female.	Male.	Female.	Male.	Female.	Male.	Female.	Male.	Female.	Male.	Female.
	V.—*Diseases of the digestive system*—Continued.																
115	Simple peritonitis (nonpuerperal)													2	2		
116	Appendicitis and abscess of the iliac fossa	1				1											
	VI.—*Diseases of the genito-urinary system and its adnexa.*																
119	Acute nephritis					1									2		
120	Bright's disease					2									2		1
123	Diseases of the bladder													1			
127	Metritis														1		
	VII.—*The puerperal state.*																
135	Puerperal hemorrhage														4		
137	Puerperal septicemia														10		
138	Puerperal albuminuria and convulsions														2		
	VIII.—*Diseases of the skin and cellular tissue*																
143	Furuncle													1			
	XIII.—*External causes.*																
164	Fractures													2			
166	Other accidental traumatisms					2								5	1		
167	Burns and scalds												1	1			
172	Accidental drowning					1											
173	Inanition (starvation)													1			
175	Other acute poisonings													1			
176	Other external violence														1		
	XIV.—*Ill-defined diseases.*																
179	Causes of death unspecified or ill defined						3							1	1		
	Total	1				49	54	1			1	2	1	213	117	10	1
	Grand total	1				103		1		1		3		330		11	

	Cause of death	From 20 years to 25 years.								From 25 years to 30 years.							
		American.		Foreign.		Filipino.		Chinese.		American.		Foreign.		Filipino.		Chinese.	
		Male.	Female.	Male.	Female.	Male.	Female.	Male.	Female.	Male.	Female.	Male.	Female.	Male.	Female.	Male.	Female.
	I.—*General diseases.*																
1	Typhoid fever (abdominal typhus)		1	2		13	8	1		1				7	5	2	
4	Intermittent fever and malarial cachexia			2		11	6					1		9	4	3	
4a	Malarial cachexia					1	1							2		2	
5	Smallpox														1		
9	Diphtheria and croup													1			
10	Influenza					1											
12	Asiatic cholera			2		5						1		5	1		
14	Dysentery			3		21	3	1			1	2		19	9	11	
15	Bubonic plague					4	3			1					2	2	
17	Leprosy					4	3							10	4		
18	Erysipelas					1											
19	Other epidemic diseases			4		13	15	7						28	22	12	

Deaths by race, sex, and age occurring among residents and transients from September 1, 1904, to August 31, 1905—Continued.

	Cause of death.	From 20 years to 25 years.								From 25 years to 30 years.							
		American.		Foreign.		Filipino.		Chinese.		American.		Foreign.		Filipino.		Chinese.	
		Male.	Female.	Male.	Female.	Male.	Female.	Male.	Female.	Male.	Female.	Male.	Female.	Male.	Female.	Male.	Female.
	I.—*General diseases*—Cont'd.																
20	Purulent infection and septicemia			1										1			
21	Glanders and farcy													1			
22	Malignant pustule														1		
26	Tuberculosis of the larynx					2	2							7	6		
27	Tuberculosis of the lungs					85	53	3				1	1	121	75	18	
28	Tuberculosis of the meninges					1								1			
29	Abdominal tuberculosis					1	5							3			
33	Tuberculosis of other organs					1											
34	General tuberculosis					2	1							2	2		
36	Syphilis							1						1	1	1	
45	Cancer and other malignant tumors of other organs or of organs not specified						1							1	1		
47	Acute articular rheumatism					2								1			
48	Chronic rheumatism and gout					1								1	1		
53	Leukemia						1										
54	Anemia, chlorosis						1							2	2		
	II.—*Diseases of the nervous system and of the organs of special sense*																
60	Encephalitis					1						1					
61	Simple peritonitis					1								3	4		
62	Progressive locomotor ataxia														1		
63	Other diseases of the spinal cord											1					
64	Congestion and hemorrhage of the brain					2	1							3		2	
67	General paralysis					1	1								1		
68	Other forms of mental alienation															1	
72	Tetanus					1								3			
74	Other diseases of the nervous system													1			
75	Diseases of the eye and its adnexa						1										
	III.—*Diseases of the circulatory system*																
77	Pericarditis													1	1		
78	Acute endocarditis						1							1	3		
79	Organic diseases of the heart					4	3	1	1	1				2	6	4	
80	Angina pectoris					1	3							1	7		
81	Diseases of the arteries, atheroma, aneurism, etc													1			
82	Embolism and thrombosis			1											1		
	IV.—*Diseases of the respiratory system.*																
90	Acute bronchitis					1											
91	Chronic bronchitis						5							1	1		
92	Broncho-pneumonia						1								1		
93	Pneumonia					14	3							17	3	1	
94	Pleurisy																1
95	Congestion and apoplexy of the lungs							1						1			
96	Gangrene of the lungs					1											
99	Other diseases of the respiratory system (phthisis excepted)													2			
	V.—*Diseases of the digestive system.*																
103	Ulcer of stomach					1											
104	Other diseases of the stomach (cancer excepted)					1								1			
106	Diarrhea and enteritis (2 years and over)			1		5	4					1		3	3	1	

Deaths by race, sex, and age occurring among residents and transients from September 1, 1904, to August 31, 1905—Continued.

	Cause of death	From 20 years to 25 years.								From 25 years to 30 years.							
		American.		Foreign.		Filipino.		Chinese.		American.		Foreign.		Filipino.		Chinese.	
		Male.	Female.	Male.	Female.	Male.	Female.	Male.	Female.	Male.	Female.	Male.	Female.	Male.	Female.	Male.	Female.
	V.—*Diseases of the digestive system*—Continued.																
108	Hernia and intestinal obstructions						1										
109	Other diseases of the intestines													1			
110	Acute yellow atrophy of the liver					2								1			
112	Cirrhosis of the liver													1	1		
114	Other diseases of the liver						2										
116	Simple peritonitis (nonpuerperal)			1		2	1							3		1	
118	Appendicitis and abscess of the iliac fossa															1	
	VI.—*Diseases of the genito-urinary system and its adnexa*																
119	Acute nephritis					3	3	1				1		1	2	1	
120	Bright's disease			1		2	1							1	2		
121	Other diseases of the kidneys and their adnexa					1											
122	Calculi of the urinary tract					1											
123	Diseases of the bladder														1		
127	Metritis						1								3		
128	Uterine hemorrhage (nonpuerperal)														1		
	VII.—*The puerperal state.*																
134	Accidents of pregnancy						1								1		
135	Puerperal hemorrhage						6								10		
136	Other accidents of labor						1								1		
137	Puerperal septicemia				1		15								12		
138	Puerperal albuminuria and convulsions		1				3								2		
139	Phlegmasia alba dolens (puerperal)						1										1
140	Other puerperal accidents—sudden death						1										
	VIII.—*Diseases of the skin and cellular tissue*																
145	Other diseases of the skin and its adnexa											1					
	IX.—*Diseases of the organs of locomotion*																
146	Nontuberculous diseases of the bones													1			
	XIII.—*External causes.*																
157	Suicide by hanging or strangulation					1											
164	Fractures					3								1			
166	Other accidental traumatisms	3		1		6	2		1	1				10	3		
167	Burns and scalds						1	2								1	
171	Electric shock					1								2			
172	Accidental drowning	1				2								2			
174	Absorption of deleterious gases (nonsuicidal)			2													
175	Other acute poisonings					1	1			1				1			
176	Other external violence													1			
	XIV.—*Ill-defined diseases.*																
179	Causes of death unspecified or ill-defined					1								1			
	Total	4	2	24	1	230	162	18	2	5	2	9	1	291	205	64	2
	Grand total	6		25		392		20		7		10		496		66	

Deaths by race, sex, and age occurring among residents and transients from September 1, 1904, to August 31, 1905—Continued.

	Cause of death.	From 30 years to 35 years.								From 35 years to 40 years.							
		American.		Foreign.		Filipino.		Chinese.		American.		Foreign.		Filipino.		Chinese.	
		Male.	Female.	Male.	Female.	Male.	Female.	Male.	Female.	Male.	Female.	Male.	Female.	Male.	Female.	Male.	Female.
	I.—*General diseases.*																
	Typhoid fever (abdominal typhus)					5	3			1		1		2	2		
4	Intermittent fever and malarial cachexia					3	1			1				1		3	
4a	Malarial cachexia						1	1						3			
10	Influenza														1		
12	Asiatic cholera	2				6		1						2	3		
14	Dysentery	1		3		18	2	11		2				16	6	9	
15	Bubonic plague							2								2	
17	Leprosy					4	2							4	1		
19	Other epidemic diseases			1		13	15	8				1		9	8	11	
20	Purulent infection and septicemia													1	1		
26	Tuberculosis of the larynx					5	2							2	2		
27	Tuberculosis of the lungs			1		69	40	21	1					65	58	18	
29	Abdominal tuberculosis					1	1							2	2	1	
33	Tuberculosis of other organs						1										
34	General tuberculosis					2			1					2			
36	Syphilis							4								1	
42	Cancer and other malignant tumors of the female genital organs						1								1		
45	Cancer and other malignant tumors of other organs or of organs not specified			1													
47	Acute articular rheumatism					1								2	1		
48	Chronic rheumatism and gout					2								1	2		
54	Anemia, chlorosis			1		2	1					1		1			
55	Other general diseases					2											
59	Other chronic poisonings											1				1	
	II.—*Diseases of the nervous system and of the organs of special sense.*																
60	Encephalitis			1										1			
61	Simple meningitis					1	2							1	1		
63	Other diseases of the spinal cord					2											
64	Congestion and hemorrhage of the brain					4	3			1				4	2	1	
65	Softening of the brain						2								1		
66	Paralysis without specified cause						1										
67	General paralysis						1								2		
68	Other forms of mental alienation							1								1	
72	Tetanus						1							1		1	
73	Chorea					2											
74	Other diseases of the nervous system										1						
	III.—*Diseases of the circulatory system*																
77	Pericarditis					1											
78	Acute endocarditis					1	1					1			3		
79	Organic diseases of the heart					3	2	7		1		2		3	4	2	
80	Angina pectoris					2	2								3		
82	Embolism and thrombosis														1		
	IV.—*Diseases of the respiratory system.*																
88	Diseases of the larynx					1											
91	Chronic bronchitis													1	1		1
92	Broncho-pneumonia						1										
93	Pneumonia			1		7								10	2		
95	Congestion and apoplexy of the lungs					1											
97	Asthma														1		

Deaths by race, sex, and age occurring among residents and transients from September 1, 1904, to August 31, 1905—Continued.

	Cause of death	From 30 years to 35 years.								From 35 years to 40 years.							
		American.		Foreign.		Filipino.		Chinese.		American.		Foreign.		Filipino.		Chinese.	
		Male.	Female.	Male.	Female.	Male.	Female.	Male.	Female.	Male.	Female.	Male.	Female.	Male.	Female.	Male.	Female.
	V.—*Diseases of the digestive system.*																
102	Diseases of the esophagus															1	
103	Ulcer of the stomach			1										1			
104	Other diseases of the stomach (cancer excepted)					1								1	1		
105	Diarrhea and enteritis (2 years and over)	1		1		3						1		3	4	1	
108	Hernia and intestinal obstructions					1											
109	Other diseases of the intestines													1			
110	Acute yellow atrophy of the liver					1		1				1					
112	Cirrhosis of the liver					1											
114	Other diseases of the liver	1								1							
115	Diseases of the spleen							1									
118	Simple peritonitis (nonpuerperal)														1		
118	Appendicitis and abscess of the iliac fossa													1			
	VI.—*Diseases of the genito-urinary system and its adnexa.*																
119	Acute nephritis					2	3	1				2			3		
120	Bright's disease					1	3	1		1		2		1	3		
127	Metritis						1										
128	Uterine hemorrhage (non puerperal)						1										
131	Cysts and other tumors of the ovary														1		
	VII.—*The puerperal state.*																
135	Puerperal hemorrhage						8		1						3		
136	Other accidents of labor														1		
137	Puerperal septicemia						7								5		
138	Puerperal albuminuria and convulsions						2										
140	Other puerperal accidents—sudden death				1												
	XIII.—*External causes.*																
155	Suicide by poison			1													
157	Suicide by hanging or strangulation														1		
164	Fractures					1											
166	Other accidental traumatisms	3				5		1						4			
167	Burns and scalds					1										1	
172	Accidental drowning					1		1						1			
175	Other acute poisonings			1													
176	Other external violence															1	
	XIV.—*Ill-defined diseases.*																
179	Causes of death unspecified or ill defined					1	1					1					
	Total	8		13	1	176	216	62	4	8	1	13		147	182	56	1
	Grand total	8		14		392		66		9		13		279		56	

Deaths by race, sex, and age occurring among residents and transients from September 1, 1904, to August 31, 1905—Continued.

	Cause of death.	From 40 years to 45 years.								From 45 years to 50 years.							
		American.		Foreign.		Filipino.		Chinese.		American.		Foreign.		Filipino.		Chinese.	
		Male.	Female.	Male.	Female.	Male.	Female.	Male.	Female.	Male.	Female.	Male.	Female.	Male.	Female.	Male.	Female.
	I.—*General diseases.*																
1	Typhoid fever (abdominal typhus)					4	1	2				2		1	2		
11	Intermittent fever and malarial cachexia	2				2								3	3		
12	Asiatic cholera		1			1								3			
14	Dysentery					5	4	6				2		12	4	4	
15	Bubonic plague						1	1							1		
17	Leprosy					3	3							1	2		
19	Other epidemic diseases					8	6	8				1		12		6	
22	Malignant pustule													1			
26	Tuberculosis of the larynx					4	4							2	5		
27	Tuberculosis of the lungs	1				47	40	11						47	29	11	
29	Abdominal tuberculosis						1								2		
34	General tuberculosis					1								1			
36	Syphilis															1	
41	Cancer and other malignant tumors of the peritoneum, intestines, and rectum													1			
42	Cancer and other malignant tumors of the female genital organs						1								1		
45	Cancer and other malignant tumors of other organs or of organs not specified						1							2			
47	Acute articular rheumatism													1			
48	Chronic rheumatism and gout													2	3		
50	Diabetes													1	1		
54	Anemia, chlorosis						2								3		
56	Acute and chronic alcoholism	1								1							
	II.—*Diseases of the nervous system and of the organs of special sense.*																
60	Encephalitis													1			
61	Simple meningitis						1							2	2		
64	Congestion and hemorrhage of the brain			1		5	4							3	6		
65	Softening of the brain						2										
67	General paralysis						1							2	1		
68	Other forms of mental alienation							2									1
72	Tetanus						1										
	III.—*Diseases of the circulatory system.*																
78	Acute endocarditis					1								1			
79	Organic diseases of the heart					1	1	6				2		2	3	7	
80	Angina pectoris			1		2									1		
81	Diseases of the arteries, atheroma, aneurism, etc			1			1							1			
	IV.—*Diseases of the respiratory system.*																
88	Diseases of the larynx											1					
91	Chronic bronchitis					1									1	2	
93	Pneumonia					5		1						4			
95	Congestion and apoplexy of the lungs													1		1	
97	Asthma					1		2							3	1	
	V.—*Diseases of the digestive system.*																
100	Diseases of the mouth and its adnexa					1											
102	Diseases of the esophagus							1								1	

Deaths by race, sex, and age occurring among residents and transients from September 1, 1904, to August 31, 1905—Continued.

	Cause of death.	From 40 years to 45 years.								From 45 years to 50 years.							
		American.		Foreign		Filipino		Chinese.		American.		Foreign.		Filipino.		Chinese.	
		Male.	Female.	Male	Female	Male	Female	Male.	Female	Male.	Female.	Male.	Female.	Male	Female	Male	Female.
	V.—*Diseases of the digestive system*—Continued																
103	Ulcer of the stomach													1			
104	Other diseases of the stomach (cancer excepted)					1	1								2		
106	Diarrhea and enteritis, 2 years and over			1		1	1					1		3	3		
108	Hernia and intestinal obstructions					2		1									
109	Other diseases of the intestines			1													
110	Acute yellow atrophy of the liver													1			
112	Cirrhosis of the liver					2								2	2		
114	Other diseases of the liver					1		1								1	
117	Other diseases of the digestive system (cancer and tuberculosis excepted)					1											
	VI.—*Diseases of the genito-urinary system and its adnexa*																
119	Acute nephritis											1		1	1		
120	Bright's disease					3	1	1						1	3	1	
121	Other diseases of the kidneys and their adnexa					1											
128	Diseases of the bladder					1		1				1					
127	Metritis						1										
131	Cysts and other tumors of the ovary						1								1		
	VII.—*The puerperal state*																
135	Puerperal hemorrhage						1										
138	Puerperal albuminuria and convulsions						1										
	XIII.—*External causes.*																
164	Fractures					1											
166	Other accidental traumatisms					2	1							1			
172	Accidental drowning													1			
176	Other external violence																
	XIV.—*Ill-defined diseases.*																
178	Sudden death													1			
179	Causes of death unspecified or ill defined	1												1		1	
	Total	5	1	5		108	82	45		1		10	1	120	86	37	1
	Grand total	6		5		190		45		1		11		206		38	

Deaths by race, sex, and age occurring among residents and transients from September 1, 1904, to August 31, 1905—Continued.

	Cause of death.	Over 50 years.								Unknown							
		American.		Foreign.		Filipino.		Chinese.		American.		Foreign.		Filipino.		Chinese.	
		Male.	Female.	Male.	Female.	Male.	Female.	Male.	Female.	Male.	Female.	Male.	Female.	Male.	Female.	Male.	Female.
	I.—*General diseases.*																
1	Typhoid fever (abdominal typhus)					4	3										
4	Intermittent fever and malarial cachexia			1		15	7			1				2			
4a	Malarial cachexia					2								1			
10	Influenza					1											
12	Asiatic cholera					1	1							1			
14	Dysentery		1		1	36	18	7									
15	Bubonic plague					1										1	
17	Leprosy					3	4										
19	Other epidemic diseases					29	23	2	1								
20	Purulent infection and septicemia						1								1		
22	Malignant pustule					1											
26	Tuberculosis of the larynx					9	4	1									
27	Tuberculosis of the lungs			4		116	68	5						2		1	
29	Abdominal tuberculosis			1		2	5										
33	Tuberculosis of other organs					1	1										
34	General tuberculosis					1	1										
36	Syphilis							1									
39	Cancer and other malignant tumors of the buccal cavity					2	3										
42	Cancer and other malignant tumors of the female genital organs						6										
43	Cancer and other malignant tumors of the breast				1		2										
46	Cancer and other malignant tumors of other organs or of organs not specified					6	4										
47	Acute articular rheumatism					1	1										
48	Chronic rheumatism and gout					24	26										
50	Diabetes				1	2	1										
54	Anemia, chlorosis			1		1	5										
	II.—*Diseases of the nervous system and of the organs of special sense.*																
61	Simple meningitis					2	2										
62	Progressive locomotor ataxia			1		1											
63	Other diseases of the spinal cord						1										
64	Congestion and hemorrhage of the brain			2	1	32	20							1			
65	Softening of the brain					2	1										
66	Paralysis without specified cause					2	1	1									
67	General paralysis					3	4										
69	Epilepsy																
72	Tetanus					2	1										
	III.—*Diseases of the circulatory system.*																
77	Pericarditis																
78	Acute endocarditis			1		4	1										
79	Organic diseases of the heart				2	13	13	5									
80	Angina pectoris					7	5										
81	Diseases of the arteries, atheroma, aneurism, etc.				1	4	5	1									
82	Embolism and thrombosis					1											
86	Other diseases of the circulatory system							1									
	IV.—*Diseases of the respiratory system.*																
90	Acute bronchitis						2										
91	Chronic bronchitis					15	7	12									
92	Broncho-pneumonia					2	2										
93	Pneumonia					8	2										

Deaths by race, sex, and age occurring among residents and transients from September 1, 1904, to August 31 1905—Continued.

	Cause of death.	Over 50 years.								Unknown							
		American.		Foreign		Filipino.		Chinese		American		Foreign.		Filipino		Chinese.	
		Male.	Female	Male.	Female	Male.	Female	Male.	Female	Male.	Female	Male.	Female.	Male.	Female.	Male.	Female
	IV.—*Diseases of the respiratory system*—Continued.																
94	Pleurisy					1	1										
97	Asthma					11	9	2									
99	Other diseases of the respiratory system (phthisis excepted)						1										
	V.—*Diseases of the digestive system.*																
102	Diseases of the esophagus							2									
103	Ulcer of the stomach			1			3										
104	Other diseases of the stomach (cancer excepted)					3	3										
106	Diarrhœa and enteritis (2 years and over)			3		20	18										
108	Hernia and intestinal obstructions					3	2										
109	Other diseases of the intestines						1										
110	Acute yellow atrophy of the liver					1											
111	Hydatid tumors of the liver					1											
112	Cirrhosis of the liver					4	3										
113	Biliary calculi					2	2										
114	Other diseases of the liver					1	3										
116	Simple peritonitis (nonpuerperal)						1										
	VI.—*Diseases of the genito-urinary system and its adnexa.*																
119	Acute nephritis					3	3							1			
120	Bright's disease			3	1	25	28	2						1	1		
121	Other diseases of the kidneys and their adnexa											1					
123	Diseases of the bladder					1											
127	Metritis						1										
128	Uterine hemorrhage (nonpuerperal)						1										
	VII.—*The puerperal state.*																
135	Puerperal hemorrhage						1										
	VIII.—*Diseases of the skin and cellular tissue*																
143	Furuncle					1											
144	Acute abscess, phlegmon					1	2										
	XII. *Old age*												1				
154	Senile debility				2	72	180	3									
	XIII.—*External causes.*																
159	Suicide by firearms					1											
160	Suicide by cutting instruments						1										
164	Fractures						1							1		1	
166	Other accidental traumatisms					2	1	1		1					1		
172	Accidental drowning									1				4		3	
176	Other external violence						1										
	XIV.—*Ill-defined diseases.*																
179	Causes of death unspecified or ill defined					2	3	1									
	Total		1	18	10	312	478	47	1	2		1		16	3	6	
	Grand total	1		28		990		48		3		1		19		6	

Deaths by race, sex, and age occurring among residents and transients from September 1, 1904, to August 31, 1905—Continued.

	Cause of death	Total.								Grand total.
		American.		Foreign.		Filipino.		Chinese.		
		Male.	Female.	Male.	Female.	Male.	Female.	Male.	Female.	
	I.—*General diseases.*									
1	Typhoid fever (abdominal typhus)	2	1	5	1	70	55	6	1	141
4	Intermittent fever and malarial cachexia	5	.....	4	.....	81	43	7	.....	140
4a	Malarial cachexia	.....	.....	.....	.....	16	4	4	.....	24
5	Smallpox	1	.....	.....	.....	3	2	.....	.....	6
6	Measles	.....	.....	.....	.....	1	.....	.....	.....	1
7	Scarlet fever	.....	.....	.....	.....	1	.....	.....	.....	1
8	Whooping cough	.....	.....	.....	.....	5	3	.....	.....	8
9	Diphtheria and croup	.....	.....	.....	.....	5	.....	.....	.....	5
9a	Diphtheria	.....	.....	.....	.....	.....	1	.....	.....	1
10	Influenza	.....	.....	.....	.....	8	3	.....	.....	11
12	Asiatic cholera	2	1	4	.....	28	10	1	.....	46
13	Cholera nostras	.....	.....	.....	.....	1	.....	.....	.....	1
14	Dysentery	3	2	10	1	208	91	50	.....	365
15	Bubonic plague	1	.....	.....	.....	15	14	9	.....	39
17	Leprosy	.....	.....	.....	.....	34	24	.....	.....	58
18	Erysipelas	.....	.....	.....	.....	5	4	.....	.....	9
19	Other epidemic diseases	.....	.....	7	.....	147	123	59	1	337
20	Purulent infection and septicemia	.....	.....	1	.....	9	7	.....	.....	17
21	Glanders and farcy	.....	.....	.....	.....	1	.....	.....	.....	1
22	Malignant pustule	.....	.....	.....	.....	2	1	.....	.....	3
26	Tuberculosis of the larynx	.....	.....	.....	.....	34	28	1	.....	63
27	Tuberculosis of the lungs	1	.....	7	1	625	398	87	2	1,121
28	Tuberculosis of the meninges	.....	.....	1	1	15	14	.....	.....	31
29	Abdominal tuberculosis	.....	.....	1	.....	23	23	1	.....	48
30	Pott's disease	.....	.....	.....	.....	1	1	.....	.....	2
31	Cold abscess and abscess by congestion	.....	.....	.....	.....	1	.....	.....	.....	1
33	Tuberculosis of other organs	.....	.....	.....	.....	3	3	.....	.....	6
34	General tuberculosis	.....	.....	.....	.....	17	6	.....	1	24
35	Scrofula	.....	.....	.....	.....	5	5	.....	.....	10
36	Syphilis	.....	.....	.....	.....	1	1	9	.....	11
38	Gonorrhea (under 5 years)	.....	.....	.....	.....	.....	1	.....	.....	1
39	Cancer and other malignant tumors of the buccal cavity	.....	.....	.....	.....	2	3	.....	.....	5
40	Cancer and other malignant tumors of the stomach and liver	.....	.....	.....	.....	1	.....	.....	.....	1
41	Cancer and other malignant tumors of the peritoneum, intestines and rectum	.....	.....	.....	.....	1	.....	.....	.....	1
42	Cancer and other malignant tumors of the female genital organs	.....	.....	.....	.....	.....	10	.....	.....	10
43	Cancer and other malignant tumors of the breast	.....	.....	.....	1	.....	2	.....	.....	3
45	Cancer and other malignant tumors of other organs, or of organs not specified	.....	.....	1	.....	11	8	.....	.....	20
46	Other tumors (tumors of the female genital organs excepted)	.....	.....	.....	.....	1	.....	.....	.....	1
47	Acute articular rheumatism	.....	.....	.....	.....	10	5	.....	.....	15
48	Chronic rheumatism and gout	.....	.....	.....	.....	32	32	.....	.....	64
50	Diabetes	.....	1	.....	1	3	2	.....	.....	7
53	Leukemia	.....	.....	.....	.....	.....	2	.....	.....	2
54	Anæmia, chlorosis	.....	.....	3	1	10	24	.....	1	39
55	Other general diseases	.....	1	.....	.....	2	1	.....	.....	4
56	Acute and chronic alcoholism	2	.....	.....	.....	.....	.....	.....	.....	2
59	Other chronic poisonings	.....	.....	1	.....	.....	.....	.....	.....	2
	II. *Diseases of the nervous system and of the organs of special sense*									
60	Encephalitis	.....	1	1	.....	4	.....	.....	.....	6
61	Simple meningitis	.....	1	3	2	212	169	.....	.....	387
62	Progressive locomotor ataxia	.....	.....	1	.....	1	1	.....	.....	3
63	Other diseases of the spinal cord	.....	.....	1	.....	2	1	.....	.....	4
64	Congestion and hemorrhage of the brain	1	.....	3	1	57	49	3	.....	114
65	Softening of the brain	.....	.....	.....	.....	2	6	.....	.....	8
66	Paralysis without specified cause	.....	.....	.....	.....	2	2	1	.....	5
67	General paralysis	.....	.....	.....	.....	6	12	1	.....	19
68	Other forms of mental alienation	.....	.....	.....	.....	.....	.....	5	1	6

Deaths by race, sex, and age occurring among residents and transients from September 1, 1904, to August 31, 1905—Continued.

	Cause of death.	Total.								Grand total
		American		Foreign		Filipino		Chinese.		
		Male.	Female.	Male.	Female.	Male.	Female.	Male.	Female.	
	II.—*Diseases of the nervous system and of the organs of special senses*—Continued.									
69	Epilepsy					3	2	1		6
70	Convulsions (nonpuerperal; 5 years and over)						1			1
71	Convulsions (under 5 years)		1		1	1,497	1,236	4	4	2,743
72	Tetanus	1				55	32	1		89
73	Chorea					2				2
74	Other diseases of the nervous system		1			6	4			11
75	Diseases of the eye and its adnexa						2			2
76	Diseases of the ear						1			1
	III.—*Diseases of the circulatory system.*									
77	Pericarditis					3	4			7
78	Acute endocarditis			3		13	11			27
79	Organic diseases of the heart	3		4	2	55	34	52	1	111
80	Angina pectoris			1		15	25			41
81	Diseases of the arteries, atheroma, aneurism, etc			1	1	6	6	1		15
82	Embolism and thrombosis			1		3	3			7
85	Hemorrhages						1			1
86	Other diseases of the circulatory system							1		1
	IV.—*Diseases of the respiratory system.*									
88	Diseases of the larynx			1	1	4	2			8
90	Acute bronchitis			1		209	190	1		401
91	Chronic bronchitis					221	185	14	1	421
92	Broncho-pneumonia	1			1	25	24			51
93	Pneumonia			2		87	20	3	1	113
94	Pleurisy					2	1		1	4
95	Congestion and apoplexy of the lungs				1	13	6	2		22
96	Gangrene of the lungs					1				1
97	Asthma					15	15	5		35
99	Other diseases of the respiratory system (phthisis excepted)					2	1			3
	V.—*Diseases of the digestive system*									
100	Diseases of the mouth and its adnexa					2				2
101	Diseases of the pharynx					1	1			2
102	Diseases of the esophagus							5		5
103	Ulcer of the stomach			2		4	3			9
104	Other diseases of the stomach (cancer excepted)					20	16			36
105	Diarrhea and enteritis (under 2 years)	1	1	1	3	168	142	1	3	320
105a	Chronic diarrhea and enteritis (under 2 years)					172	141			313
106	Diarrhea and enteritis (2 years and over)	1		12		163	203	2		381
107	Intestinal parasites					5	4			9
108	Hernia and intestinal obstructions					7	5	2		14
109	Other diseases of the intestines			1		2	1			4
110	Acute yellow atrophy of the liver			1		6		1		8
111	Hydatid tumors of the liver					1				1
112	Cirrhosis of the liver					12	6			18
113	Biliary calculi					2	2			4
114	Other diseases of the liver	2				4	6	2		14
115	Diseases of the spleen					1		1		2
116	Simple peritonitis (nonpuerperal)			1		14	9	2		26
117	Other diseases of the digestive system (cancer and tuberculosis excepted)					1				1
118	Appendicitis and abscess of the iliac fossa	1				2		1		4

Deaths by race, sex, and age occurring among residents and transients from September 1, 1904, to August 31, 1905—Continued.

	Cause of death.	Total.								Grand total.
		American.		Foreign.		Filipino.		Chinese.		
		Male.	Female.	Male.	Female.	Male	Female.	Male	Female.	
	VI.—*Diseases of the genito-urinary system and its adnexa.*									
119	Acute nephritis			1	1	18	25	3		48
120	Bright's disease	1		6	1	48	48	5	1	110
121	Other diseases of the kidneys and their adnexa			1		3				4
122	Calculi of the urinary tract					1				1
123	Diseases of the bladder			1		3	1	1		6
127	Metritis						8			8
128	Uterine hemorrhage (nonpuerperal)						3			3
131	Cysts and other tumors of the ovary						3			3
	VII.—*The puerperal state.*									
134	Accidents of pregnancy						2			2
135	Puerperal hemorrhage						33		1	34
136	Other accidents of labor						3			3
137	Puerperal septicemia				1		49			50
138	Puerperal albuminuria and convulsions		1				10			11
139	Phlegmasia alba dolens (puerperal)						1		1	2
140	Other puerperal accidents—sudden death				1		1			2
	VIII.—*Diseases of the skin and cellular tissue.*									
143	Furuncle					2				2
144	Acute abscess, phlegmon					1	2			3
145	Other diseases of the skin and its adnexa			1		2	1			4
	IX.—*Diseases of the organs of locomotion.*									
146	Nontuberculous diseases of the bones					3	2			5
	X.—*Malformations.*									
150	Congenital malformations (stillbirths excepted)	1				7	5			13
	XI.—*Early infancy.*									
151	Congenital debility, icterus, and sclerema		1	1		222	180		2	406
152	Other diseases peculiar to early infancy			1		25	21			47
153	Lack of care	1				13	19			33
	XII.—*Old age.*									
154	Senile debility				2	72	130	3		207
	XIII.—*External causes.*									
155	Suicide by poison			1						1
157	Suicide by hanging or strangulation					1	1			2
159	Suicide by firearms					1				1
160	Suicide by cutting instruments						1			1
164	Fractures					9	1	1		11
166	Other accidental traumatisms	8		1		38	9	2	1	59
167	Burns and scalds				1	5	4	4		14
171	Electric shock					3				3
172	Accidental drowning	2				15	1	4		22
173	Inanition (starvation)				1	3	2			6
174	Absorption of deleterious gases (nonsuicidal)			2						2
175	Other acute poisonings	2		1		4	2			9
176	Other external violence					1	3	1		5

Deaths by race, sex, and age occurring among residents and transients from September 1, 1904, to August 31, 1905—Continued.

	Cause of death.	Total								Grand total.
		American		Foreign.		Filipino.		Chinese.		
		Male.	Female.	Male.	Female	Male.	Female.	Male.	Female.	
	XIV.—*Ill-defined diseases.*									
177	Dropsy					1				1
178	Sudden death					1				1
179	Causes of death unspecified or ill-defined	2		1		11	13	2		29
	Total	45	13	104	28	5,041	4,123	353	24	
	Grand total	58		132		9,164		377		9,731

Of the total number of deaths occurring during the period from September 1, 1904, to August 31, 1905, 9,731, including transients, 6,028 were of persons less than 16 years of age. Of the remaining 3,703 adults of both sexes, the certificates of death showed that 2,360 had the following occupations:

Sex and occupation.	Number.	Sex and occupation.	Number.
MALES.		MALES—continued.	
Professional:		Manufacturing and mechanical industry—Continued.	
Architects, artists, teachers of art, etc.	4	Iron and steel workers	1
Clergymen and priests	6	Leather workers	1
Engineers and surveyors	1	Machinists	14
Journalists	1	Masons (brick and stone)	6
Lawyers	4	Mill and factory operatives (textiles)	1
Musicians and teachers of music	11	Painters, glaziers, varnishers, etc	17
Teachers (school)	4	Tailors	34
Others of this class	3	Tinners and tinware makers	8
Clerical and official:		Others of this class	8
Bookkeepers, clerks, and copyists	117	Agriculture, transportation and other outdoor.	
Bankers, brokers, and officials of companies	4	Boatmen and canal men	26
Collectors, auctioneers, and agents	3	Draymen, drivers, and teamsters	64
Mercantile and trading:		Farmers, planters, and farm laborers	35
Apothecaries, pharmacists, shopkeepers, etc	42	Gardeners, florists, nurserymen, etc	9
Merchants and dealers	100	Sailors, pilots, fishermen, and oystermen	57
Hucksters and peddlers	3	Stock raisers, herders, and drovers	1
Public entertainment:		Others of this class	1
Saloon keepers, liquor dealers, bartenders, and restaurant keepers	3	All other occupations	54
Personal service, police and military:		Total	1,687
Barbers and hairdressers	15		
Janitors and sextons	5	FEMALES.	
Policemen, watchmen, and detectives	19	Nuns, Sisters of Charity, etc	5
Soldiers, sailors, and marines	4	Teachers in schools	5
Laboring and servant:		Merchants and dealers, etc	82
Laborers (not agricultural)	636	Hotel and boarding-house keepers	2
Servants	103	Laundresses	176
Manufacturing and mechanical industry:		Nurses and midwives	5
Bakers and confectioners	5	Servants	32
Blacksmiths	9	Embroiderers	18
Boot, shoe, and slipper makers	16	Cigar makers and tobacco workers	82
Butchers	2	Mill and factory operatives	4
Cabinetmakers and upholsterers	12	Milliners	2
Carpenters and joiners	108	Dressmakers and seamstresses	210
Cigarmakers and tobacco workers	22	All other occupations	80
Clock and watch repairers, jewelers, etc	24	Total	673
Compositors, printers, etc	8		
Engineers and firemen (not locomotive)	24	Grand total	2,360
Glass blowers and glassworkers	1		
Hat and cap makers	2		

Deaths occurring in Bilibid prison from September 1, 1904, to August 31, 1905.

Disease.	Presidio.				Cárcel				Total.
	Filipinos.		Chinese.		Filipinos.		Chinese.		
	Male.	Female.	Male.	Female.	Male.	Female.	Male.	Female.	
Intermittent fever and malarial cachexia	9				7				16
Malarial cachexia					1				1
Asiatic cholera	15				4				19
Dysentery	39		1		24				64
Other epidemic diseases	5				9	1			15
Tuberculosis of the lungs	139	3			48	3			193
Abdominal tuberculosis					1				1
Tuberculosis of other organs	1				1				2
General tuberculosis	4				1	1			6
Cancer and other malignant tumors of the peritoneum, intestines, and rectum	1								1
Simple meningitis	6				2				8
Other forms of mental alienation					1				1
Pericarditis					1				1
Acute endocarditis	1								1
Diseases of the arteries, atheroma, aneurism, etc	1								1
Embolism and thrombosis					1				1
Pneumonia	35				31				66
Ulcer of the stomach					1				1
Diarrhea and enteritis (2 years and over)	3				1				4
Acute yellow atrophy of the liver	1								1
Acute nephritis	1				1	1			3
Bright's disease	3								3
Other diseases of the kidneys and their adnexa	1								1
Senile debility	4				1	1			6
Fractures	1								1
Other accidental traumatisms	3				21				24
Causes of death unspecified or ill-defined	1								1
Total	274	3	1		157	7			442

Disease.	Condition				Cemetery.	
	Married.	Single.	Widower.	Unknown.	Loma.	Norte.
Intermittent fever and malarial cachexia	7	8	1			16
Malarial cachexia	1					1
Asiatic cholera	5	14				19
Dysentery	33	26	3	2		64
Other epidemic diseases	11	2		2		15
Tuberculosis of the lungs	87	95	5	6		193
Abdominal tuberculosis		1				1
Tuberculosis of other organs	1	1				2
General tuberculosis	2	4				6
Cancer and other malignant tumors of the peritoneum, intestines, and rectum	1			1		1
Simple meningitis	5	1	1	1		8
Other forms of mental alienation				1		1
Pericarditis				1		1
Acute endocarditis		1				1
Diseases of the arteries, atheroma, aneurism, etc	1					1
Embolism and thrombosis		1				1
Pneumonia	40	22	3	1		66
Ulcer of the stomach	1					1
Diarrhea and enteritis (2 years and over)	2	2				4
Acute yellow atrophy of the liver	1					1
Acute nephritis	1	2				3
Bright's disease	2	1				3
Other diseases of the kidneys and their adnexa		1				1
Senile debility	2	3	1			6
Fractures	1					1
Other accidental traumatisms	13	9		2		24
Causes of death unspecified or ill-defined	1					1
Total	218	194	14	16		442

Report of prescriptions filled at the municipal dispensaries from September 1, 1904, to August 31, 1905.

No.	Health district.	Americans.				Foreigners.			
		Adults.		Children		Adults.		Children.	
		Male.	Female.	Male.	Female.	Male.	Female.	Male	Female.
1	San Nicolás								
2	Tondo	42				8			
3	Quiapo	3				13			
4	Santa Cruz	4				3			
5	Sampaloc								
6	Intramuros	4							
7	Ermita, etc	45					43		
	Total	98				24	43		

No.	Health district.	Filipinos.				Chinese.				Total.
		Adults.		Children.		Adults.		Children.		
		Male.	Female.	Male.	Female.	Male	Female.	Male	Female.	
1	San Nicolás	1,794	1,159	384	316	3				3,656
2	Tondo	3,470	2,917	784	678	19				7,918
3	Quiapo	1,504	1,335	627	462	2				3,946
4	Santa Cruz	828	713	342	289					2,174
5	Sampaloc	1,516	1,290	853	592					4,251
6	Intramuros	1,073	1,035	423	264					2,799
7	Ermita, etc	2,887	1,687	975	1,083					6,720
	Total	13,067	10,136	4,388	3,684	24				31,464

NOTE.—Three hundred and fifty-one prescriptions for antiseptic bandages, medicines, etc., were made by the clinic established in the sanitary station of Tondo.

Report of sick and wounded city poor attended by municipal physicians from September 1, 1904, to August 31, 1905.

No.	Health district and physician	Americans.				Foreigners.			
		Adults.		Children.		Adults.		Children.	
		Male.	Female	Male	Female	Male.	Female.	Male.	Female.
1	San Nicolás, Dr F. Herrera								
2	Tondo, Dr V. Pantoja	1				1			
3	Quiapo, Dr P Gabriel	4				5	1		
4	Santa Cruz, Dr C. Reyes	5			1	4			
5	Sampaloc, Dr F. Castañeda								
6	Intramuros, Dr V. Cavanna	5		2		7	3	1	
7	Ermita, Paco, etc, Dr. J. B. Cabarrus	2				1	1		
	Total	17		2	1	18	5	1	

No.	Health district and physician	Filipinos.				Chinese.				Total.
		Adults.		Children		Adults		Children.		
		Male.	Female.	Male.	Female.	Male	Female.	Male	Female.	
1	San Nicolás, Dr F. Herrera	258	231	96	109					693
2	Tondo, Dr V Pantoja	651	648	258	204					1,763
3	Quiapo, Dr P. Gabriel	347	407	189	143	2				1,097
4	Santa Cruz, Dr C Reyes	274	283	120	96					733
5	Sampaloc, Dr F. Castañeda	399	630	384	375					1,788
6	Intramuros, Dr. V. Cavanna	390	463	211	172					1,254
7	Ermita, Paco, etc, Dr J. B. Cabarrus	415	410	196	201	1				1,227
	Total	2,734	3,022	1,453	1,299	3				8,555

Report of sick and wounded city poor attended by municipal physicians from September 1, 1904, to August 31, 1905—Continued.

No.	Health district and physician.	Cured.		Deaths.		Number of visits.
		Male.	Female.	Male.	Female.	
1	San Nicolás, Dr. F. Herrera	180	208	15	12	2,965
2	Tondo, Dr. V Pantoja	658	641	48	44	5,887
3	Quiapo, Dr. P. Gabriel	159	171	42	57	2,116
4	Santa Cruz, Dr. C Reyes	210	204	49	35	3,202
5	Sampaloc, Dr. F. Castañeda	275	437	101	78	3,812
6	Intramuros, Dr V Cavanna	340	342	40	34	5,508
7	Ermita, Paco, etc., Dr. J. B. Cabarrus	348	362	71	65	3,422
	Total	2,165	2,365	366	325	26,417

Report of San Lázaro Hospitals.

Leper department, from September 1, 1904, to August 31, 1905.

	Europeans.		Filipinos.		Chinese.		Total.
	Male.	Female.	Male.	Female.	Male.	Female.	
Number of patients in hospital at last report	....	1	132	91	1	.....	225
Number of patients received	.....	.....	49	19	1	.....	69
Number of patients discharged	.....	.....	1	3	1	.....	5
Number of deaths	....	.....	34	22	.....	.....	56
Number of patients transferred	.....	.....	.....	1	.....	.....	1
Number of patients escaped	.....	.....	5	....	.....	.....	5
Number of patients remaining in hospital	.....	1	141	84	1	.....	227

Insane department, from November 15, 1904, to August 31, 1905.

	Americans.		Europeans.		Filipinos.		Japanese.		Chinese.		Others.		Total.
	Male.	Female.	Male.	Female.	Male.	Female.	Male.	Female.	Male.	Female.	Male.	Female.	
Number of patients received	5	1	4	....	76	25	....	1	3	....	3	....	118
Number of patients discharged	2	1	2	....	17	9	....	1	2	....	....	....	34
Number of deaths	....	....	....	....	12	1	....	....	....	....	....	....	13
Number of patients transferred	1	....	....	....	....	2	....	....	....	....	1	....	4
Number of patients remaining in hospital	2	....	2	....	47	13	....	....	1	....	2	....	67

Report of Sampaloc Hospital.

Women's department, from December 9, 1904, to August 31, 1905.

	Americans.	Europeans.	Filipinos.	Japanese.	Total.
Number of patients in hospital at last report	5	.....	51	16	72
Number of patients received	6	11	438	206	661
Number of patients discharged	11	7	462	215	695
Number of patients transferred	.....	3	5	2	10
Number of patients remaining in hospital	.....	1	22	5	28

General inspection of houses, premises, and vaults, with improvements ordered by m inspectors, sanitary inspectors, and assistant sanitary inspectors, from September 1, to August 31, 1905.

Houses inspected by sanitary inspectors	
Houses reinspected for verification of work ordered	
Houses inspected by assistant sanitary inspectors	2
Houses reinspected by assistant sanitary inspectors	
Houses ordered cleaned (written)	
Houses ordered cleaned (verbal)	
Houses cleaned	
Houses ordered whitewashed and painted	
Houses whitewashed and painted	
Number of disinfections	
Number of houses recommended condemned and removed	
Number of houses condemned and removed	
Number of localities where "squatters" are located	
Number of samples of water, food, etc., sent to laboratory	
Number of reports from same	
Number of houses where garbage has not been removed for two days	
Number of persons reported sick to municipal physicians	
Cesspools and vaults ordered cleaned	
Cesspools cleaned	
Yards ordered cleaned	
Yards cleaned	
Yards ordered repaired (repaved, etc.)	
Yards repaired	
Number of cholera cases roported by assistant sanitary inspectors	
Number of cholera cases found alive	
Number of cholera cases found dead	
Number of orders issued during the year	
Number of orders complied with during the year	
Number of orders awaiting action	
Number of orders pending in court	
Average number of food tiendas in districts	1
Average number of regular inspectors on duty	
Average number of emergency inspectors on duty	
Number of leper cases sent to San Lazaro Hospital	
Number of plague cases reported	
Number of smallpox cases reported	
Houses in which traps are set	
Traps set	3
Rats caught by rat catchers	
Rats caught by traps	
Rats purchased	
Average number of rat catchers employed	

Report of disinfections from September 1, 1904, to August 31, 1905.

Causes for disinfections.	Number of disinfections.	Number of contacts.	Causes for disinfections.	Number of disinfections.	Nu of t
Cholera	34	255	Measles	1	
Suspected cholera	8	19	Chickenpox	3	
Plague	45	183	Chicken cholera	1	....
Suspected plague	8	15	Plague rats	3	
Smallpox	37	137	Lymphangitis	85	....
Suspected smallpox	1	1	Glanders	88	....
Typhoid fever	15	10	Surra	19	....
Leprosy	12	12	Rinderpest	1	....
Tuberculosis	47	4	Exhumations	306	....
Tetanus	5	.....	Insanitary condition	1,516	....
Scarlet fever	1	.....			
Erysipelas	1	.....	Total	2,187	

Amount of vaccine virus distributed by the board of health from September 1, 19 August 31, 1905.

	Units.		Un
Number on hand August 31, 1904	8,650	Distributed as per itemized statement.	3,(
Received from laboratory	3,078,550	Remaining on hand August 31, 1905	
Total to be accounted for	3,087,200		

Report of operations of the pail-conservancy system, from September 1, 1904, to August 31, 1905.

PAIL COLLECTIONS.

Where cleaned.	Number of installations.	Pails in use.	Pails cleaned.
Private houses	17,897	19,309	559,825
Public buildings	793	2,001	56,121
Midden sheds	644	16,464	333,284
Military buildings	204	1,242	39,048
Provisional pails	.....	2	60
Total	19,538	39,018	968,338

VAULTS CLEANED.

Where cleaned.	Cleaned by odorless excavators.		
	Vaults cleaned.	Loads removed.	Gallons removed.
Private houses	2,395	3,881	1,940,500
Public buildings	172	2,827	1,413,500
Military buildings	64	986	493,000
Total	2,631	7,694	3,847,000

Report of action taken on licenses from September 1, 1904, to August 31, 1905.

Business for which license is desired.	License applications approved.	License applications disapproved.	Total applications acted upon.
Aerated waters	8	1	9
Bakeries	32	2	34
Boarding houses	7	.....	7
Chocolates, make and sell	8	.....	8
Cooked foods and native products	18	33	51
Distilleries (perfumes)	8	.....	8
Distilleries (spirits)	4	.....	4
Drug stores	35	.....	35
Drug stores (Chinese)	2	.....	2
Laundries	31	3	34
Liquor, first-class bar	12	.....	12
Liquor, second-class bar	7	1	8
Lodging houses	8	.....	8
Restaurants	133	17	150
Soap, make and sell	29	2	31
Sweetmeats, make and sell	23	1	24
Theaters	16	.....	16
Native wine	41	51	92
Billiard parlors	1	3	4
Blood, to sell	1	.....	1
Candles, make and sell	1	1	2
Cinematographs	1	.....	1
Cleaning and dyeing	5	.....	5
Dancing schools	2	2	4
Hotels	8	.....	8
Leather, tan and sell	4	.....	4
Liquor, first-class restaurant	16	.....	16
Paint, make and sell	1	.....	1
Sausage, make and sell	2	.....	2
Sell roots and herbs	1	.....	1
Undertaking	3	1	4
Vermicelli, make and sell	2	.....	2
Brewers	1	.....	1
Lye water, make and sell	1	.....	1
Refrigerated water, make and sell	1	.....	1
Wafers, make and sell	1	.....	1
Coffins, make and sell	1	.....	1
Salted goods, to sell	1	.....	1
Livery stables	.....	1	1
Liquor, second-class restaurant	1	.....	1
Miscellaneous	5	.....	5
Total	482	119	601

General inspection of houses, premises, and vaults, with improvements ordered by medical inspectors, sanitary inspectors, and assistant sanitary inspectors, from September 1, 1904, to August 31, 1905.

Houses inspected by sanitary inspectors	25,749
Houses reinspected for verification of work ordered	7,764
Houses inspected by assistant sanitary inspectors	253,059
Houses reinspected by assistant sanitary inspectors	72,783
Houses ordered cleaned (written)	26
Houses ordered cleaned (verbal)	63,830
Houses cleaned	59,871
Houses ordered whitewashed and painted	149
Houses whitewashed and painted	104
Number of disinfections	2,187
Number of houses recommended condemned and removed	419
Number of houses condemned and removed	17
Number of localities where "squatters" are located	580
Number of samples of water, food, etc., sent to laboratory	19
Number of reports from same	5
Number of houses where garbage has not been removed for two days	3,090
Number of persons reported sick to municipal physicians	5,346
Cesspools and vaults ordered cleaned	2,283
Cesspools cleaned	2,215
Yards ordered cleaned	28,615
Yards cleaned	25,299
Yards ordered repaired (repaved, etc.)	35
Yards repaired	33
Number of cholera cases roported by assistant sanitary inspectors	18
Number of cholera cases found alive	28
Number of cholera cases found dead	10
Number of orders issued during the year	1,080
Number of orders complied with during the year	1,004
Number of orders awaiting action	238
Number of orders pending in court	1
Average number of food tiendas in districts	1,530.6
Average number of regular inspectors on duty	15.6
Average number of emergency inspectors on duty	4
Number of leper cases sent to San Lazaro Hospital	20
Number of plague cases reported	43
Number of smallpox cases reported	30
Houses in which traps are set	97,983
Traps set	345,552
Rats caught by rat catchers	55,416
Rats caught by traps	57,589
Rats purchased	97,327
Average number of rat catchers employed	40

Report of disinfections from September 1, 1904, to August 31, 1905.

Causes for disinfections.	Number of disinfections.	Number of contacts.	Causes for disinfections.	Number of disinfections.	Number of contacts.
Cholera	34	256	Measles	1	3
Suspected cholera	8	19	Chickenpox	3	4
Plague	45	183	Chicken cholera	1	.....
Suspected plague	8	15	Plague rats	3	14
Smallpox	37	137	Lymphangitis	85	.....
Suspected smallpox	1	1	Glanders	88	.....
Typhoid fever	15	10	Surra	19	.....
Leprosy	12	12	Rinderpest	1	.....
Tuberculosis	47	4	Exhumations	306	.....
Tetanus	5	.....	Insanitary condition	1,516	.....
Scarlet fever	1	.....			
Erysipelas	1	.....	Total	2,187	657

Amount of vaccine virus distributed by the board of health from September 1, 1904, to August 31, 1905.

	Units.		Units.
Number on hand August 31, 1904	8,650	Distributed as per itemized statement.	3,034,900
Received from laboratory	3,078,550	Remaining on hand August 31, 1905	52,300
Total to be accounted for	3,087,200		

Places at which vaccine was distributed.

Place.	Units.	Place.	Units.
City of Manila:		Provinces—Continued.	
Vaccine division	284,950	Marinduque	2,500
Other institutions	8,300	Masbate	22,200
Total	293,250	Mindoro	4,000
Provinces.		Misamis	21,600
Albay	207,500	Moro	1,000
Ambos Camarines	50,200	Negros, Occidental	66,000
Antique	500	Negros, Oriental	27,000
Bataán	9,000	Nueva Ecija	13,400
Batanes	2,000	Nueva Vizcaya	1,000
Batangas	97,500	Palawan	1,250
Benguet	13,200	Pampanga	25,300
Bohol	6,000	Pangasinán	121,400
Bulacán	31,200	Rizal	131,200
Cagayán	227,000	Romblón	66,000
Cápiz	22,000	Sámar	23,500
Catanduanes	5,000	Sorsogón	46,000
Cavite	234,000	Surigao	4,000
Cebú	720,000	Tárlac	30,000
Ilocos Norte	91,500	Tayabas	29,500
Ilocos Sur	70,100	Unión	111,500
Iloilo	27,050	Zambales	3,000
Isabela	78,000	Zamboanga	26,000
Laguna	46,050	Total	2,741,650
Lepanto-Bontoc	17,500	Grand total	3,034,900
Leyte	9,000		

Report of vaccinations, city of Manila, from September 1, 1904, to August 31, 1905.

Age and sex.	Vaccinations.			Inspections.						
				Takes.			Nontakes.			Grand total.
	Primary.	Secondary.	Total.	Primary.	Secondary.	Total.	Primary.	Secondary.	Total.	
Children under 1 year	2,006	67	2,073	609	105	714	759	172	925	1,639
Children between 1 and 2 years	3,308	612	3,920	1,057	835	1,892	1,579	673	2,252	3,644
Children between 2 and 5 years	4,375	1,806	6,181	1,380	860	2,240	2,750	1,712	4,462	6,702
Children between 6 and 12 years	13,986	7,256	20,642	2,379	2,019	4,398	5,823	3,965	9,308	13,706
Adult males	36,568	15,514	52,082	4,525	3,928	8,453	12,765	9,583	22,348	30,801
Adult females	24,501	10,722	35,223	4,051	3,199	7,250	11,110	8,090	19,200	26,450
Total	84,144	35,977	120,121	14,001	10,446	24,447	34,280	24,215	58,495	[illegible]

Smallpox and plague reports, city of Manila, from September 1, 1904, to August 31, 1905.

Race.	Smallpox.				Plague.			
	Cases.		Deaths.		Cases.		[illegible]	
	Male.	Female.	Male	Female.	Male.	Female.	Male.	Female.
Americans	4	.....	1	.....	1	.....	1	.....
Filipinos	17	5	3	2	14	16	14	15
Foreigners	1	2	.....	.....	.....	.....	.....	.....
Chinese	.....	.....	.....	.....	10	.....	9	.....
Total	22	7	4	2	25	16	24	15

General inspection of houses, premises, and vaults, with improvements ordered by medical inspectors, sanitary inspectors, and assistant sanitary inspectors, from September 1, 1904, to August 31, 1905.

Houses inspected by sanitary inspectors	25,749
Houses reinspected for verification of work ordered	7,764
Houses inspected by assistant sanitary inspectors	253,059
Houses reinspected by assistant sanitary inspectors	72,783
Houses ordered cleaned (written)	26
Houses ordered cleaned (verbal)	63,830
Houses cleaned	59,371
Houses ordered whitewashed and painted	149
Houses whitewashed and painted	104
Number of disinfections	2,187
Number of houses recommended condemned and removed	419
Number of houses condemned and removed	17
Number of localities where "squatters" are located	580
Number of samples of water, food, etc., sent to laboratory	19
Number of reports from same	5
Number of houses where garbage has not been removed for two days	3,030
Number of persons reported sick to municipal physicians	5,346
Cesspools and vaults ordered cleaned	2,283
Cesspools cleaned	2,215
Yards ordered cleaned	28,615
Yards cleaned	25,299
Yards ordered repaired (repaved, etc.)	35
Yards repaired	33
Number of cholera cases roported by assistant sanitary inspectors	18
Number of cholera cases found alive	28
Number of cholera cases found dead	10
Number of orders issued during the year	1,080
Number of orders complied with during the year	1,004
Number of orders awaiting action	238
Number of orders pending in court	1
Average number of food tiendas in districts	1,530.6
Average number of regular inspectors on duty	15.6
Average number of emergency inspectors on duty	4
Number of leper cases sent to San Lazaro Hospital	20
Number of plague cases reported	43
Number of smallpox cases reported	30
Houses in which traps are set	97,983
Traps set	345,552
Rats caught by rat catchers	55,416
Rats caught by traps	57,589
Rats purchased	97,327
Average number of rat catchers employed	40

Report of disinfections from September 1, 1904, to August 31, 1905.

Causes for disinfections.	Number of disinfections.	Number of contacts.	Causes for disinfections.	Number of disinfections.	Number of contacts.
Cholera	34	255	Measles	1	3
Suspected cholera	8	19	Chickenpox	3	4
Plague	45	183	Chicken cholera	1	.....
Suspected plague	8	15	Plague rats	3	14
Smallpox	37	137	Lymphangitis	85	.....
Suspected smallpox	1	1	Glanders	88	.....
Typhoid fever	15	10	Surra	19	.....
Leprosy	12	12	Rinderpest	1	.....
Tuberculosis	47	4	Exhumations	306	.....
Tetanus	5	.....	Insanitary condition	1,516	.....
Scarlet fever	1	.....			
Erysipelas	1	.....	Total	2,187	657

Amount of vaccine virus distributed by the board of health from September 1, 1904, to August 31, 1905.

	Units.		Units.
Number on hand August 31, 1904	8,650	Distributed as per itemized statement.	3,034,900
Received from laboratory	3,078,550	Remaining on hand August 31, 1905	52,300
Total to be accounted for	3,087,200		

Places at which vaccine was distributed.

Place.	Units.	Place	Units.
City of Manila:		Provinces—Continued.	
Vaccine division	284,950	Marinduque	2,500
Other institutions	8,300	Masbate	22,200
Total	293,250	Mindoro	4,000
Provinces		Misamis	21,600
Albay	207,500	Moro	1,000
Ambos Camarines	50,200	Negros, Occidental	66,000
Antique	500	Negros, Oriental	27,000
Bataan	9,000	Nueva Ecija	13,400
Batanes	2,000	Nueva Vizcaya	1,000
Batangas	97,500	Palawan	1,250
Benguet	18,200	Pampanga	25,300
Bohol	6,000	Pangasinán	121,400
Bulacán	31,200	Rizal	131,200
Cagayán	227,000	Romblón	66,000
Cápis	22,000	Sámar	23,500
Catanduanes	5,000	Sorsogón	46,000
Cavite	234,000	Surigao	4,000
Cebú	720,000	Tárlac	30,000
Ilocos Norte	91,500	Tayabas	29,500
Ilocos Sur	70,100	Unión	111,500
Iloilo	27,050	Zambales	5,000
Isabela	78,000	Zamboanga	26,000
Laguna	46,050	Total	2,741,650
Lepanto-Bontoc	17,500	Grand total	3,084,900
Leyte	9,000		

Report of vaccinations, city of Manila, from September 1, 1904, to August 31, 1905.

Age and sex.	Vaccinations.			Inspections.						
				Takes.			Nontakes.			Grand total.
	Primary.	Secondary.	Total.	Primary.	Secondary.	Total.	Primary.	Secondary.	Total.	
Children under 1 year	2,006	67	2,073	609	105	714	758	172	925	1,639
Children between 1 and 2 years	3,308	612	3,920	1,057	335	1,392	1,579	673	2,252	3,644
Children between 2 and 5 years	4,375	1,806	6,181	1,380	860	2,240	2,760	1,712	4,462	6,702
Children between 5 and 12 years	13,366	7,256	20,642	2,379	2,019	4,398	5,323	3,985	9,308	13,706
Adult males	36,568	15,514	52,082	4,526	3,928	8,454	12,765	9,583	22,348	30,801
Adult females	24,501	10,722	35,223	4,051	3,199	7,250	11,110	8,090	19,200	26,450
Total	84,144	35,977	120,121	14,001	10,446	24,447	34,280	24,215	58,495	82,942

Smallpox and plague reports, city of Manila, from September 1, 1904, to August 31, 1905.

Race	Smallpox.				Plague.			
	Cases.		Deaths.		Cases.		Deaths.	
	Male.	Female.	Male	Female.	Male.	Female.	Male.	Female.
Americans	4	.....	1	.....	1	.....	1	.....
Filipinos	17	5	3	2	14	16	14	15
Foreigners	1	2	.....	.....	.....	.....	.....	.....
Chinese	.....	.....	.....	.....	10	.....	9	.....
Total	22	7	4	2	25	16	24	15

Smallpox and plague reports, city of Manila, etc.—Continued.

District and age.	Smallpox.		Plague.	
	Cases.	Deaths.	Cases.	Deaths.
Health district:				
No. 1, San Nicolás	2		13	12
No. 2, Tondo	5	2	13	13
No. 3, Quiapo	4	1	4	3
No. 4, Santa Cruz	6	3	5	5
No. 5, Sampaloc	2			
No. 6, Intramuros	7		4	4
No. 7, Ermita, Paco, etc	3		2	2
Total	29	6	41	39
Age:				
Under 1 year	1			
1 year to 10 years	8	4	3	3
10 years to 20 years	6	1	17	16
20 years to 30 years	9	1	12	11
30 years to 40 years	4		4	4
40 years to 50 years			3	3
Over 50 years	1		1	1
Unknown			1	1
Total	29	6	41	39

Reports received of lepers living in the various provinces of the Philippine Islands to August 31, 1906.

Province.	Race.	Male.	Female.	Children.		Single.		Married.		Widower.	Widow.	Total.
				Male.	Female.	Male.	Female.	Male.	Female.			
Abra	Filipinos	6	5	1		4	3	1	2			11
Albay	do	38	28	4	4	25	14	7	5	2	3	64
Ambos Camarines	do	54	15	6		23	7	20	7	5	1	69
Antique	do	61	47	17	14	18	15	20	14	6	4	108
Bataán	do	16	6	1	1	10	1	4	2	1	2	22
Batangas	do	20	11			14	5	5	2	1	4	31
Benguet[a]	do	32	11	1	1	1		21	10	9		43
Bohol	do	78	55	5	3	34	39	35	12	4	1	133
Bulacán	do	28	16		1	11	9	15	5	2	1	44
Cagayán	do	53	45			25	16	25	19	3	10	98
Cápiz	do	41	18	1		17	11	21	4	2	3	59
Cavite	do	53	24	3	3	31	14	16	3	3	4	77
Cebú	do	431	254	93	86	224	173	105	29	9	14	685
Ilocos Norte	do	76	34	2	2	25	17	45	12	4	3	110
Ilocos Sur	do	148	82	11	2	76	44	45	23	16	13	230
Iloilo	do	106	37	9	1	63	22	24	6	12	6	145
Isabela	do	15	6			5		9	3	1	3	21
Laguna	do	16	12	1	2	7	5	8	3		2	28
Lepanto-Bontoc[a]	do	15	4	1		5	1	8		1	3	19
Leyte	do	64	45	6	6	23	11	32	17	3	11	109
Masbate	do	13	11			7	4	3	4	3	3	24
Misamis	do	42	11	4		18	5	16	3	4	3	53
Moro[a]	do	149	77	3	3	80	44	45	18	9	12	220
Negros, Occidental	do	24	8	2	2	9	6	12		1		32
Negros Oriental	do	67	53	4	17	34	33	21	1	8	2	120
Nueva Ecija	do	36	17	1		15	7	16	6	4	4	53
Nueva Vizcaya[a]	do	2	4			1		1	2		2	6
Pampanga	do	8	7			4	5	3	2	1		15
Pangasinán	do	44	31		1	16	7	17	17	11	6	75
Rizal	do	68	36	2	4	33	9	33	20		3	104
Romblón	do	4	10			1	3	3	6		1	14
Sámar	do	143	115		1	43	50	74	43	26	21	258
Sorsogón	do	80	37		2	40	17	33	12	7	6	117
Surigao[a]	do	2	1							2	1	3
Tárlac	do	19	11	1		3	5	13	6	2		30
Tayabas	do	19	6	1		9	3	8	2	1	1	25
Unión	do	30	16	1		10	7	16	4	3	5	46
Zambales	do	25	27			13	14	12	9		4	52
San Lázaro Hospital (Manila)	[b]	142	85	24	12	73	44	33	16	12	13	[b]227
Total		2,264	1,316	205	120	1,056	670	825	349	178	177	3,580

[a] Revised reports not received.

[b] Europeans, 1; Filipinos, 225; Chinese, 1.

Reports received of insane persons living in the various provinces of the Philippine Islands to August 31, 1905.

Province.	Race.	Male.	Female.	Children		Single.		Married		Widower.	Widow.	Total.
				Male.	Female.	Male.	Female.	Male.	Female.			
Abra	Filipinos	34	9	3	4	25	1	6	1	..	3	43
Albay	do	18	19	2	.	8	12	5	3	5	4	37
Ambos Camarines	do	66	55	1	4	46	36	15	9	4	6	121
Antique	do	35	31	..	..	28	15	7	12	2	4	66
Bataán	do	14	8	..		7	..	6	4	1	4	22
Batangas	do	65	59	..	..	34	40	7	8	4	11	124
Bohol	do	279	236	11	7	206	212	50	45	6	16	559
Bulacán	do	28	24		. .	19	12	6	3	3	4	52
Cagayán	do	20	17	..	. .	13	9	6	3	1	3	37
Cápiz	do	64	76	1	2	44	36	16	20	3	16	140
Cavite	do	32	27	..	.	28	10	6	10	3	7	59
Cebú	do	77	50	.	1	61	47	14	5	2	6	136
Ilocos Norte	do	69	30	..	.	54	18	10	8	3	6	99
Ilocos Sur	do	94	61	1	1	62	38	25	10	6	13	155
Iloilo	do	108	95	1	1	80	49	21	24	3	21	203
Isabela	do	7	4	...	...	2	1	5	2	..	1	11
Laguna	do	71	72	3	5	45	40	18	18	5	9	143
Lepanto-Bontoc	do	10	7			6	5	3		1	3	17
Leyte	do	126	117	5	1	93	84	35	10	3	19	243
Masbate	do	15	25	1	1	10	15	4	8	1	3	41
Mindoro	do	9	7	.		8	4	1	2	.	1	16
Misamis	do	70	59	2	.	47	40	16	10	5	9	129
Negros, Occidental	do	69	89	1	.	49	21	13	10	6	8	108
Negros, Oriental	do	130	123	3	1	99	99	21	17	7	12	253
Nueva Écija	do	28	19		1	24	10	5	6	1	2	47
Nueva Vizcaya	do	4	5		..	4	1	. .	3	. .	1	9
Pampanga	do	29	27	..	. .	21	15	8	7	. .	5	56
Pangasinán	do	73	74	2	. .	44	32	16	25	11	10	147
Rizal	do	41	20	..	.	30	12	7	4	4	4	61
Romblón	do	22	5		.	5	2	11	3	0	. . .	27
Sámar	do	32	28	. . .	. . .	24	19	4	4	4	6	60
Sorsogón	do	86	65	.	. . .	65	37	17	21	4	7	151
Surigao	do	9	10	. .	.	5	6	2	2	2	2	19
Tárlac	do	8	8	1	.	4	5	3	1	. .	2	16
Tayabas	do	150	122	8	3	112	86	24	19	6	14	272
Unión	do	36	24	. . . .	. . .	18	16	14	6	4	2	60
Zambales	do	4	2	. . . .	. .	3	2	1	.. .	..	. . . .	6
San Lázaro Hospital (Manila).	(a)	64	13	3	..	38	11	10	2	3	.	a 97
Total		2,087	1,725	60	32	1,487	1,002	428	356	125	246	8,812

a Americans, 2; Europeans, 2; Filipinos, 60; Chinese, 1; others, 2.

Reports received of blind persons living in the various provinces of the Philippine Islands to August 31, 1905.

Province.	Race	Children		Single		Married		Widower	Widow.	Total
		Male	Female.	Male	Female	Male	Female.			
Abra	Filipinos	1	4	10	15	18	22	14	15	99
Albay	do	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Ambos Camarines	do	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Antique	do	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Bataán	do	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Batangas	do	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Bohol	do	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Bulacán	do	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Cagayán	do	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Cápiz	do	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Cavite	do	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Cebú	do	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Ilocos Norte	do	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Ilocos Sur	do	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Iloilo	do	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

REPORT OF THE CHIEF HEALTH INSPECTOR FOR THE PHILIPPINE ISLANDS, SEPTEMBER 1, 1904, TO SEPTEMBER 1, 1905.

DEPARTMENT OF THE INTERIOR,
BUREAU OF HEALTH FOR THE PHILIPPINE ISLANDS,
OFFICE OF THE CHIEF HEALTH INSPECTOR,
Manila, P. I., September 1, 1905.

SIR: I have the honor to submit the following statistical report of work pertaining to the office of the chief health inspector for the year ending August 31, 1905:

The tables presented were prepared in part by Dr. Thomas R. Marshall, chief health inspector for the Philippine Islands, before his departure for the United States. I have made no attempt to present an original report, but have followed the scheme formulated by the legal incumbent of the office.

Act No. 159 providing for the establishment of the board of health for the Philippine Islands prescribes that, subject to the sanitary laws of the islands and the regulations of the insular board of health, the chief health inspector shall make or cause to be made regular inspections of the work of municipal boards of health; of all employees of the insular board of health; the cleaning of sewers, streets, walks, lanes, public squares and parks; the collection and disposal of garbage, dead animals, night soil, and contents of cesspools; of the sanitation of houses, factories, mills, schools, prisons, dairies, markets, meat shops, bakeries, public water supplies, public bath houses, wells, cisterns, cemeteries, undertaking establishments, asylums, jails, barracks, bar rooms, theaters, and all public institutions and places of public resort.

The work of cleaning sewers, streets, and parks and the collection and disposal of garbage, night soil, and contents of cesspools in the city of Manila is carried on under the direction of the city engineer through the agency of the several divisions of his department, and is performed in a very satisfactory business-like manner.

The city authorities control the markets and public slaughterhouses. Taking into consideration the surrounding conditions, these establishments are remarkably clean. It is hoped that the municipal board may provide suitable food screens and enforce their use by all venders in the markets, in order that the practice, so generally prevalent, of handling the foods may be broken up and the sources of infection by flies eliminated.

SANITARY SUPERVISION OF THE CITY OF MANILA.

The city of Manila is divided into seven health districts, each district having a health station and its quota of sanitary employees, the chief officer being a medical inspector. The duties of the medical inspector are various. Primarily he is on guard to protect his district from the invasion of quarantinable diseases, and secondarily as the representative of the central board of health, and is expected to employ every means within his power to improve the health and sanitary conditions of those under his supervision.

Each station is required to send in a daily report giving information on the following subjects: The number of houses inspected by the sanitary inspector, houses reinspected for verification or work ordered, houses where work ordered has been completed, houses inspected by assistant sanitary inspectors, houses ordered cleaned, houses cleaned, houses ordered whitewashed or painted, houses whitewashed or painted, houses, interiors, canals, etc., disinfected, houses where garbage has not been removed for two days, number of persons reported sick to the municipal physician, cesspools and vaults ordered cleaned, cesspools and vaults cleaned, yards ordered cleaned, yards cleaned, yards ordered repaired, repaved, etc., yards repaired, repaved, etc., houses in which traps are set, houses in which bane is placed, traps set, plates with ratsbane placed, rats caught by rat catchers, rats caught by traps, rats caught by poison, rats purchased, rat catchers employed.

In addition to the foregoing, a daily record is required of the number of sick visited, the number of diagnoses of quarantinable diseases, number of criminal cases

investigated, number of accident cases attended, number of sick animals within their district, the work of midwives, the number of municipal prescriptions written, and such other special reports as may be required.

Medical inspectors are also charged with the duties of enforcing within their districts the provisions of Act No. 310, regulating the practice of medicine and surgery in the Philippine Islands, and they are required, also, to report all unregistered pharmacists and dentists, and to visit drug stores and dental offices from time to time and see that the respective laws are complied with and to report upon the sanitary conditions.

From each station is supervised the sanitary condition of markets, tiendas, and other places within the district, where food and drink is kept for sale, and also of other businesses or occupations affecting the public health.

Considerable attention has been given to the spreading of oil for the purpose of destroying larvæ of mosquitos as a prophylactic measure against malaria, and to the work of rat catching as a prophylactic measure against bubonic plague. It is the concensus of opinion among medical men the world over that rats are factors in the spread of this dangerous disease.

At the third annual conference of the State and territorial health officers with the United States Public Health and Marine-Hospital Service, convened at Washington, D. C., May 15, 1905, Dr. Edmund Souchon, of New Orleans, introduced the following resolution, which was adopted by the conference:

"Whereas the eradication of plague from California through the united and harmonious efforts of the United States Public Health and Marine-Hospital Service, State and local boards of health, by means of rat extermination and extensive sanitary improvements throughout the affected area, is an accomplished fact: Therefore be it

"*Resolved*, That this conference of the United States Public Health and Marine-Hospital Service with the State boards of health expresses its entire satisfaction with the methods and the results obtained."

CHOLERA.

Cholera has again reappeared in Manila after a respite of nearly eighteen months. The board of health for the Philippine Islands, on April 27, 1904, declared by resolution that:

"Whereas cases of Asiatic cholera have occurred in but three provincial towns of the Philippine Islands since February 8, 1904; and

"Whereas only one case of Asiatic cholera has been reported as occurring at any place in the Philippine Islands since March 8, 1904; and

"Whereas the city of Manila was declared on March 23 to be free from the infection of Asiatic cholera; on motion

"*Resolved*, That the islands comprising the Philippine Archipelago are, and are hereby, declared to be free from the infection of Asiatic cholera; and be it further

"*Resolved*, That the commissioner of public health be directed to send a copy of these resolutions to the honorable the secretary of the interior, the municipal board, the United States Public Health and Marine-Hospital Service, and the collector of customs."

From the date specified in the resolution until August 23, 1905, so far as is known, the country remained free from the disease. On August 23, 1905, the disease reappeared in Manila, probably having been brought in from China through commercial intercourse. The entire sanitary force is, at this time, engaged in combating the epidemic. The board of health is much better equipped for handling the sick than it was during the epidemic of 1902–1904.

The new San Lázaro Infectious Disease Hospital has been opened along modern lines. Trained nurses and skilled attendants are constantly on duty.

From the 23d to the 31st of August there were 51 cases, with 46 deaths. The epidemic has just begun as this report closes. What it may bring forth or what the results may be, at this time can not be surmised.

The nature and extent of the sanitary work supervised by this office may be more readily understood from the following tables:

Sanitary work accomplished by health stations.

	Stations.							
	A.	C.	F.	G.	I.	J.	L.	Total.
Houses inspected by sanitary inspector	3,007	3,253	4,383	4,834	4,066	3,163	3,043	25,749
Houses inspected, verification of work	290	900	1,632	1,400	107	1,940	1,435	7,764
Houses inspected by assistant sanitary inspectors	46,643	69,426	22,231	24,845	34,286	26,791	27,837	252,059
Houses ordered cleaned:								
Written			1		1		26	28
Verbal	7,394	25,154	7,209	6,855	1,960	10,110	5,148	63,830
Houses cleaned	7,389	24,428	4,419	6,734	1,896	10,110	3,496	58,471
Houses ordered whitewashed or painted	2	6	79	5	14	3	40	149
Houses whitewashed or painted	5	1	52			3	43	104
Houses, etc., disinfected	59	438	110	513	89	566	454	2,181
Houses recommended condemned or removed	83	115	100		115		6	419
Houses condemned and removed	4	4			9			17
Houses, garbage not removed for two days		72	2	1	1	499	2,456	3,030
Orders complied with	634	16	235	10	11	31	67	1,004
Orders waiting action		15	143	21	4	16	89	288
Orders pending in court				1				1
Cesspools and vaults ordered cleaned	96	53	281	1,647	16	109	179	2,383
Cesspools and vaults cleaned	85	30	269	1,545	4	119	163	2,215
Yards ordered cleaned	1,915	7,890	2,943	3,346	854	4,818	6,849	28,615
Yards cleaned	1,914	7,565	2,206	3,332	831	4,818	4,681	25,299
Yards ordered repaired (repaved, etc.)	1	4					30	35
Yards repaired							33	33
Cholera cases reported by assistant sanitary inspector		5				8		13
Cholera cases found "alive"	3	3	5	6	2	7	2	[illegible]
Cholera cases found "dead"	1	2		3	3	1		[illegible]
Plague cases reported	13	14	6	4		4	2	[illegible]
Smallpox cases reported	2	6	2	6	2	8	4	30
Leper cases sent to San Lázaro		7	2	1	5	3	2	20
Orders issued during the year	645	52	249	12	13	57	92	1,060
Samples of water, foods, etc., sent to laboratory						5	14	19
Reports from same						5		5
Persons reported sick, municipal physician	416	1,627	256	330	1,196	960	574	5,346

Rats caught by rat catchers during the year.

Month.	Stations.							
	A	C.	F.	G.	I.	J.	L.	Total.
1904.								
September	2,585	3,057	1,458	1,744	868	1,687	699	12,048
October	3,086	3,057	1,122	1,862	1,558	1,365	1,699	13,699
November	3,290	2,907	1,418	1,939	1,795	1,662	1,468	14,471
December	4,010	2,567	1,744	2,009	1,675	2,062	1,744	15,801
1905.								
January	3,480	2,540	2,429	2,752	1,892	1,945	1,967	16,995
February	4,362	2,962	2,637	3,640	1,918	1,802	2,296	19,609
March	4,431	3,009	3,040	4,826	1,798	1,533	1,749	20,386
April	2,702	5,525	995	1,692	6	77		10,987
May	4,296	3,504	810	1,637	373	173	194	15,987
June	5,129	9,233	1,196	2,121	156	[illegible]	497	18,969
July	5,161	10,476	1,496	4,246	69	740	682	22,869
August	6,027	12,783	2,345	4,711	16	867	1,856	28,555
Total	48,459	66,550	20,630	33,178	12,126	14,548	14,841	210,325

Cases detected and disposed of by health stations during the year.

	Station A—District No. 1.				Station C—District No. 2.			
	Cholera.	Plague.	Smallpox.	Leprosy.	Cholera.	Plague.	Smallpox.	Leprosy.
1904.								
September						1	2	
October								
November								
December							2	
1905.								
January		2				1		1
February		1				2		
March		6	1			1		3
April		1				1		
May		1				1	1	1
June		1	1			3		
July		1				1		
August	5				2	2		1
Total	5	13	2		2	13	5	6

	Station F—District No. 2.				Station G—District No. 4.			
	Cholera.	Plague.	Smallpox.	Leprosy.	Cholera.	Plague.	Smallpox.	Leprosy.
1904.								
September							2	
October								
November				1				
December						1		
1905.								
January			2			1		
February		1	1				2	
March		1		1		1	1	
April			1					
May		1						
June		1				1	1	
July								
August	5				28	1		1
Total	5	4	4	2	28	5	6	1

	Station I—District No. 5.				Station J—District No. 6.			
	Cholera.	Plague.	Smallpox.	Leprosy.	Cholera.	Plague.	Smallpox.	Leprosy.
1904.								
September			1					
October								
November								
December				2				1
1905.								
January						3	2	
February							2	1
March			1	1				
April							2	
May				1				
June							1	
July								
August	5			1	4	1		1
Total	5		2	5	4	4	7	3

Cases detected and disposed of by health stations during the year—Continued.

	Station L—District No. 7.			
	Cholera.	Plague.	Smallpox.	Leprosy.
1904.				
September				
October				
November				
December				
1905.				
January			1	
February				
March		1	1	1
April				
May			1	1
June		1		
July				
August	2			
Total	2	2	3	2

Report of vaccinations accomplished in Manila during the year.

Manila	Vaccinations accomplished.	Number of takes.	Number of non-takes.
1904.			
September	24,391	3,482	9,716
October	19,247	6,577	12,060
November	25,725	2,346	6,156
December	24,418	2,901	7,281
1905.			
January	10,594	7,501	18,650
February	2,525		
March	12,827	1,267	2,617
April	1,094	1,573	2,069
May			
June			
July	869		
August			
Total	120,490	24,447	58,500

Provincial vaccinations.

BY PROVINCIAL VACCINATORS UNDER THE DIRECTION OF A MEDICAL INSPECTOR OF THE BOARD OF HEALTH.

Province.	Number vaccinated.	Number of takes.	Number of non-takes.	Date.
Cagayán	76,545	16,782	49,914	Mar. 24–Apr 10, 1905. Aug 29-Dec 26, 1904.
Isabela	67,488	19,763	40,701	Dec 5, 1904–Mar, 15, 1905.
Ilocos Norte	69,200	12,600	33,640	May 3–Aug 5 1905.
La Unión	31,494	7,891	31,910	Mar 23–June 26, 1905.
Cavite	136,023	41,109	64,645	Mar 6–Aug 27, 1905.
Rizal	123,389	29,331	68,601	Jan 24 Aug 31, 1905.
Cebú	263,297	100,956	108,059	Sept. 1, 1904–Aug. 31, 1905.
Romblón	21,343			Apr. 12–25, 1905.
Total	778,779	228,432	397,470	

Provincial vaccinations—Continued.

BY PRESIDENTS OF PROVINCIAL BOARDS OF HEALTH.

Province.	Number vaccinated.	Number of takes.	Number of non-takes.	Date.
Unión	1,397	.....	.....	Feb., 1905.
Lepanto-Bontoc	930	.....	.....	July, 1905.
Pangasinán	24,310	11,039	7,093	Apr. 8–June 30, 1905.
Zambales	930	250	680	Nov. 1, 1904–Mar. 1, 1905.
Bataán	1,663	980	983	Feb. 1–June 1, 1905.
Batangas	87,344	.....	.....	Nov., 1904–June, 1905.
Tayabas	4,856	.....	.....	Jan. 1–Mar. 1, 1905.
Ambos Camarines	776	.....	.....	Feb., 1905.
Albay	371	43	328	May, 1905.
Sorsogón	a 35,054	a 21,582	a 13,533	Sept. 1, 1904–July 1, 1905.
Negros Occidental	147	.....	.....	
Bohol	7,145	.....	.....	Mar., 1905.
Total	164,923	33,844	22,617	

a Approximate.

INOCULATIONS AGAINST BUBONIC PLAGUE.

During the past year only 50 preventive (prophylactic) inoculations were made. Of this number 20 were made in January and 6 in February and 24 in August, 1905. No curative (antitoxin) inoculations were made in districts during the past year.

Extermination and prevention of mosquitoes.

STATION A.

Month.	Quantity of oil used, in ounces.	Area oiled, square feet.	Canals, pools, cesspools, wells, drains, etc., oiled.
1904.			
September	1,273	.....	544
October	282	.....	276
November	.....	.....	.....
December	132	.....	235
1905.			
January	741	.....	555
February	785	.....	473
March	1,208	.....	909
April	270	.....	98
May	.....	.....	.....
June	.....	.....	.....
July	.....	.....	.....
August	.....	.....	.....

STATION C.

1904.			
September	.....	.....	.....
October	.....	.....	.....
November	.....	.....	.....
December	8,200	.....	283
1905.			
January	4,224	.....	695
February	1,024	.....	397
March	2,048	.....	595
April	256	.....	89
May	.....	.....	.....
June	.....	.....	.....
July	.....	.....	.....
August	.....	.....	.....

Extermination and prevention of mosquitoes—Continued.

STATION F.

Month.	Quantity of oil used, in ounces.	Area oiled, square feet.	Canals, pools, cesspools, wells, drains, etc., oiled.
1904.			
September	13,960	24,000	33
October	.....	.....	.....
November	.....	.....	.....
December	296	.....	18
1905.			
January	12,160	.....	221
February	7,680	12,000	68
March	5,680	.....	63
April	.....	.....	.....
May	.....	.....	.....
June	.....	.....	.....
July	.....	.....	.....
August	.....	.....	.....

STATION G.

1904.			
September	800	15,000	.....
October	.....	.....	.....
November	.....	.....	.....
December	884	.....	83
1905.			
January	2,816	23,600	19
February	5,124	76,800	.....
March	4,480	67,200	.....
April	640	9,600	40
May	448	.....	.....
June	.....	.....	.....
July	.....	.....	.....
August	128	.....	3

STATION I.

1904.			
September	.....	.....	.....
October	3,840	.....	500
November	.....	.....	.....
December	6,400	.....	500
1905.			
January	2,560	.....	560
February	1,280	.....	.....
March	.....	.....	.....
April	.....	.....	.....
May	.....	.....	.....
June	.....	.....	.....
July	.....	.....	.....
August	.....	.....	.....

STATION J.

1904.			
September	4,864	.....	1,269
October	4,864	.....	856
November	.....	.....	.....
December	2,848	.....	883
1905.			
January	3,744	.....	580
February	1,920	.....	594
March	5,248	.....	1,122
April	982	.....	60
May	.....	.....	.....
June	1,920	6,000	.....
July	640	.....	820
August	3,680	.....	204

Extermination and prevention of mosquitoes—Continued.

STATION L.

Month.	Quantity of oil used, in ounces.	Area oiled, square feet.	Canals, pools, cesspools, wells, drains, etc., oiled.
1904.			
September	12,800	.....	488
October	.....	.....	.....
November	.....	.....	.....
December	5,624	.....	406
1905.			
January	3,840	.....	147
February	7,680	.....	300
March	5,624	.....	392
April	640	.....	65
May	640	.....	50
June	1,280	.....	65
July	128	.....	15
August	.....	.....	.....

Consolidated report of extermination and prevention of mosquitoes.

Month.	Quantity of oil used, in ounces.	Area oiled (square feet).	Canals, pools, cesspools, wells, drains, etc., oiled.
1904.			
September	33,697	29,000	2,854
October	8,966	.....	1,132
November	.....	.....	.....
December	19,084	.....	2,298
1905.			
January	28,805	28,600	2,757
February	25,493	88,800	1,736
March	24,488	67,200	3,061
April	2,738	9,600	247
May	1,048	.....	90
June	3,200	6,000	.....
July	768	.....	595
August	3,808	.....	243
Total	152,115	224,200	14,528

Report of municipal physicians for the year September 1, 1904, to September 1, 1905.

DR. FLORENTINO HERRERA, HEALTH DISTRICT NO. 1.

	1904.				1905.								Total.
	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	
Visits made to the poor	293	265	240	278	329	227	262	229	270	166	210	205	2,974
Poor treated at station	....	40	25	9	9	8	18	21	17	12	12	24	196
Prescriptions written	249	262	327	361	430	261	318	269	292	199	259	222	3,437
Labor cases attended	....	....	1	...	....	1	...	...	1	...	.....	.....	3
Dressings applied	....	2	.....	8	22	2	4	2	4	...	2	1	49
Cases discharged cured	36	33	25	30	40	26	34	34	38	30	31	33	386
Cases remaining	20	15	15	24	10	22	21	14	13	13	18	14	.....

DR. V. PANTOJA, HEALTH DISTRICT NO. 2.

Visits made to the poor	352	455	317	269	445	585	225	435	556	516	595	522	5,224
Poor treated at station	.....	....	.....	.....	41	49	76	63	71	92	75	34	501
Prescriptions written	536	584	562	463	547	632	475	494	629	600	483	453	6,448
Accident cases attended	....	....	....	.....	.....	.....	.....	1	.....	.....	1	1	3
Cases discharged cured	119	145	104	99	91	121	110	79	92	104	99	125	1,291
Cases remaining	22	9	8	38	47	41	34	22	34	43	58	16	.....

Report of municipal physicians for the year September 1, 1904, to September 1, 1905—Con.

DR. PROCESO GABRIEL, HEALTH DISTRICT NO. 3.

	1904.			1905.								Total.
	Sept.	Oct	Nov	Dec	Jan	Feb.	Mar	Apr.	May	June	July	Aug.	
Visits made to the poor	153	143	164	199	136	145	204	158	118	175	186	212	2,013
Poor treated at station	7	15	24	19	25	43	62	64	46	47	54	45	441
Prescriptions written	230	270	299	278	315	242	284	239	219	286	346	348	3,356
Labor cases attended	...	...	...	1	...	...	...	1	...	...	2	...	4
Accident cases attended	1	3	4	3	2	3	3	6	4	3	4	1	42
Dressings applied	14	23	20	5	2	26	30	25	6	16	17	14	198
Cases discharged cured	35	24	31	44	26	16	40	23	18	28	25	35	345
Cases remaining	7	5	12	6	10	12	13	11	4	0	8	14	...

DR. CANUTO REYES, HEALTH DISTRICT NO. 4.

Visits made to the poor	276	351	274	249	182	136	219	207	291	408	414	245	3,262
Poor treated at station	7	8	6	2	...	1	4	9	9	20	30	14	110
Prescriptions written	191	317	193	130	93	84	114	100	162	155	198	137	1,874
Labor cases attended	52	69	56	48	44	40	59	42	70	81	100	71	732
Accident cases attended		4	5	1			1	3	2	7	7	4	34
Dressings applied		30	47	1	7	6	15	58	66	142	68	31	471
Cases discharged cured	26	37	36	30	28	22	48	19	43	35	68	36	428
Cases remaining	18	13	15	11	10	13	7	22	17	31	14	18	.....

DR. FRANCISCO CASTAÑEDA, HEALTH DISTRICT NO. 5.

Visits made to the poor	348	282	241	295	196	216	275	214	317	287	240	277	3,068
Poor treated at station	95	64	137	52	42	42	80	44	85	93	102	100	942
Prescriptions written	397	318	312	417	301	302	322	303	411	302	405	297	4,177
Labor cases attended	..	3	..	3	1	1	.. ..	1	.. .	....	1	2	12
Accident cases attended		1	.. ..	.....	.....	1	2	.....	1	.....	.....	1	6
Dressings applied	20	1	14	4	1	21	52	8	44	8	1	1	181
Cases discharged cured	75	58	54	68	70	53	49	52	60	69	65	60	713
Cases remaining	26	30	34	40	23	18	24	21	26	25	32	20	.....

DR. VICENTE CAVANNA, HEALTH DISTRICT NO. 6.

Visits made to the poor	462	371	367	440	498	506	530	420	685	470	391	526	5,616
Poor treated at station	12	22	30	36	49	51	62	54	62	69	69	49	571
Prescriptions written	199	225	220	259	249	287	258	208	261	248	211	194	2,814
Labor cases attended	1	..	2	.	1	1	.		1	1	3	3	13
Accident cases attended		1	2		...	6	4	6	2	2	5	3	30
Dressings applied		41	23	13	6	86	67	54	52	65	45	20	472
Cases discharged cured	4	39	31	41	54	57	60	51	77	85	72	69	682
Cases remaining	14	15	28	32	28	35	27	29	21	27	27	25	.....

DR. JUAN CABARRUS, HEALTH DISTRICT NO. 7.

Visits made to the poor	267	263	243	332	331	270	358	302	285	296	301	277	3,475
Poor treated at station	42	51	47	77	87	63	79	57	61	79	67	68	778
Prescriptions written	393	469	444	674	601	407	789	415	375	411	353	483	5,804
Labor cases attended	..			. .	.	..	.	.. ..	1	.	..	2	....	3
Accident cases attended	6	8	7	16	14	13	21	14	14	12	4	6	135
Dressings applied	18	25	29	87	44	23	72	29	18	14	7	26	392
Cases discharged cured	62	54	50	57	63	52	74	57	51	14	59	49	662
Cases remaining	10	7	16	10	30	10	12	14	11	16	10	18	.....

DR TEE HAN KEE (AT LARGE)

Visits made to the poor	89	120	96	113	102	87	132	91	102	109	104	98	1,243
Poor treated at station	21	29	31	28	17	36	30	27	25	22	52	25	347
Prescriptions written	41	32	43	47	29	52	87	75	67	71	83	77	704
Labor cases attended	1		..		....	1	.	. .	....	....	.....	.....	2
Accident cases attended	4	3	4	2	4	1	5	4	9	7	11	10	64
Dressings applied	15	14	21	8	13	3	26	29	38	31	40	27	265
Cases discharged cured	10	6	14	17	14	12	19	15	16	13	17	14	166
Cases remaining	12	10	9	7	11	16	14	11	9	7	16	18	.....

Services rendered by municipal free dispensaries for the year.

No. 1.—QUIAPO.

Month.	Prescriptions filled.				Persons to whom medicine was given.	Persons receiving surgical dressings.
	Municipal physicians.	Private physicians.	Medical inspectors.	Total.		
1904.						
September	1,013	.....	14	1,027	385	21
October	936	108	33	1,077	418	29
November	1,019	191	25	1,235	428	26
December	1,028	162	17	1,207	501	29
1905.						
January	930	164	19	1,113	441	26
February	886	175	3	1,064	373	25
March	952	78	4	1,034	361	39
April	920	48	10	978	354	44
May	1,025	44	12	1,081	395	51
June	961	78	6	1,045	339	69
July	1,134	39	8	1,181	401	42
August	1,027	32	12	1,071	403	61
Total	11,831	1,119	163	13,113	4,799	462

No. 2.—TONDO.

1904.						
September	785	21	29	835	241	74
October	848	58	6	912	239	114
November	881	81	14	976	240	107
December	826	62	125	1,013	90	270
1905.						
January	991	46	35	1,072	104	266
February	891	35	41	967	105	278
March	900	54	121	1,075	269	76
April	763	43	128	934	215	25
May	926	17	162	1,105	267	23
June	793	30	156	979	257	25
July	742	23	268	1,033	310	23
August	690	24	367	1,081	311	22
Total	10,036	494	1,452	11,982	2,648	1,298

No. 3.—PACO.

1904.						
September	396	.....	27	423	100	6
October	470	.....	104	574	104	9
November	444	1	233	678	162	23
December	674	10	116	800	140	21
1905.						
January	601	11	39	651	155	15
February	407	6	20	433	117	15
March	791	5	22	818	135	20
April	425	7	11	443	101	14
May	349	11	38	398	121	17
June	416	6	148	570	116	16
July	353	20	29	402	127	6
August	505	4	21	530	117	18
Total	5,831	81	808	6,720	1,495	175

Consolidated report of services rendered by municipal free dispensaries during the year.

Month.	Prescriptions filled.	Persons to whom medicine was given.	Persons receiving surgical dressings.
1904.			
September	2,285	726	101
October	2,563	761	152
November	2,889	880	156
December	3,020	731	320
1905.			
January	2,836	700	307
February	2,464	595	313
March	2,927	765	135
April	2,355	670	83
May	2,584	783	91
June	2,594	712	110
July	2,616	838	71
August	2,682	831	96
Total	31,815	8,942	1,985

Prescriptions filled from each district during the year.

Month.	Health district.							Total.
	No. 1.	No. 2.	No. 3.	No. 4.	No. 5.	No. 6.	No. 7.	
1904.								
September	253	582	252	191	397	187	423	2,285
October	282	628	310	272	301	196	574	2,563
November	370	605	411	235	383	207	678	2,889
December	405	582	354	176	454	225	800	2,996
1905.								
January	450	579	424	146	322	235	651	2,807
February	258	673	341	121	334	276	483	2,486
March	353	670	323	143	334	241	818	2,882
April	285	608	260	124	408	191	443	2,314
May	294	770	239	196	413	238	398	2,548
June	213	711	298	210	313	226	570	2,541
July	265	731	365	214	190	412	402	2,579
August	228	779	369	146	407	165	530	2,624
Total	3,656	7,918	3,946	2,174	4,251	2,799	6,720	31,464

Prescriptions not classified, 351; grand total, 31,815.

District midwife report.

	Health district.							Total.
	No. 1.	No. 2.	No. 3.	No. 4.	No. 5.	No. 6.	No. 7.	
Midwives	1	2	1	1	1	1	1	8
Births reported	355	962	138	134	585	87	618	2,879
Births attended	127	414	99	80	109	58	304	1,191

Health district population of Manila.

Health district.	Population.	Health district.	Population.
No. 1	53,573	No. 5	20,279
No. 2	39,045	No. 6	17,463
No. 3	18,487	No. 7	28,054
No. 4	43,040		

Quarantinable diseases.

	Smallpox.		Bubonic plague.		Cholera.	
	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.
September—						
1901 to 1902	56	22	29	30	3,983	3,084
1902 to 1903	101	17	[illegible]	166	1,179	894
1903 to 1904	73	32	94	87	469	426
1904 to 1905	29	6	41	39	51	46

License applications.

License applications acted on	601
Approved	482
Disapproved	119

Report of service rendered by corral.

Plague cases transferred	43
Cholera cases transferred	51
Smallpox cases transferred	29
Leper cases transferred	20

Disinfecting service.

Houses disinfected	2,181
Places disinfected:	
Insanitary condition	1,516
Glanders	88
Surra	19
Lymphangitis	35
Cattle stables to prevent rinderpest	1

Dead-wagon service.

Bodies transferred to morgue	375

Report of inspections in connection with public prostitutes for the year.

WOMEN'S DEPARTMENT, STATION 1, HEALTH DISTRICT NO. 5.

	1904.				1905.								Total.
	Sept.	Oct.	Nov.	Dec	Jan.	Feb.	Mar	Apr.	May.	June.	July.	Aug.	
Examinations	1,062	977	1,317	1,113	1,104	1,089	1,315	999	1,317	1,088	1,052	1,393	13,776
Slides taken	1,062	975	1,315	1,113	1,108	1,089	1,305	985	1,304	1,087	1,033	1,375	13,606
Women examined													
Americans	16	17	20	18	22	19	23	26	31	28	24	27	270
Filipinos	112	109	122	130	120	118	134	121	143	135	124	148	1,516
Japanese	172	174	186	183	182	177	184	177	189	183	183	188	2,178
Russians	2	2	2	3	3	3	2	2	2	2	2	2	27
Spanish	3	3	1	1	1	1	1	..	..	..	..	..	11
Others	14	13	13	11	11	11	10	10	8	8	8	8	125
Total	318	318	344	346	339	329	354	336	373	356	341	373	4,127
Women sent to Sampaloc Hospital	82	72	64	74	66	55	109	68	84	57	73	67	871
Gonorrhea cases	71	64	48	65	58	49	70	55	54	37	52	49	672
Chancroid cases	11	12	8	9	8	6	29	[illegible]	26	16	11	16	161
Syphilitic cases	..	..	1	..	..	..	..	..	..	..	..	..	1

Professional work accomplished in Manila by medical inspectors.

STATION A.

	1904.			1905.									Total.
	Sept.	Oct.	Nov	Dec	Jan	Feb.	Mar	Apr	May.	June.	July.	Aug	
Sick visited		12	16	6	3	5	16	12	12	7	4	15	108
Diagnoses made of quarantinable diseases	3				2	1	7		1	1	1	4	20
Criminal cases investigated								2				1	3
Accident cases attended									3	6		2	11

STATION C.

Sick visited	6	5	18	52	34	32	63	60	64	82	113	103	632
Diagnoses made of quarantinable diseases	2				1	2		2	3	3	1	6	20
Criminal cases investigated			1										1
Accident cases attended			2	2		1							5

STATION F.

Sick visited	1	3	6	6	1		2	2	4	6	4	2	36
Diagnoses made of quarantinable diseases					1		4	1		3	3	5	17
Criminal cases investigated											1		1
Accident cases attended		5	2					3	1		4	6	20

STATION G.

Sick visited	7	6	5	10		1	5	2	3	4	4	1	48
Diagnoses made of quarantinable diseases	1			1			4			1		13	20
Criminal cases investigated													
Accident cases attended							2	1		1			4

STATION I

Sick visited	10	20	25	32	28	30	11	3	11	50	27	12	259
Diagnoses made of quarantinable diseases	1						1	2	1	1		6	12
Criminal cases investigated	1				6	9	7	2	1			2	28
Accident cases attended				1							1		2

STATION J.

Sick visited	22	10	25	32	48	65	58	60	55	50	38	45	538
Diagnoses made of quarantinable diseases	2			6	6	5	3	4	3	2	1	15	47
Criminal cases investigated	4	8	2	2	4	2	2	6	7	2	3	5	47
Accident cases attended	8	7	9	10	12	7	5	5	6	4	2	2	77

Professional work accomplished in Manila by medical inspectors—Continued.

STATION L.

	1904.				1905.								Total.
	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	
Sick visited	10	30	40	30	20	5	10	10	8	25	20	[illegible]	289
Diagnoses made of quarantinable diseases	1				1	1	1					3	7
Criminal cases investigated		1											1
Accident cases attended	2	7	12	6	8	2	2			2		1	42

The work of the bureau of health extends to every municipality and barrio in the Philippine Islands and is only equaled in its magnitude by the responsibility connected with it. The health authorities, in common with other officials of the insular government, are confronted with many difficult and serious problems, upon the correct solution of which rests to a great extent the future welfare of the islands. Verily no governmental undertaking ever depended more upon individual effort and upon the exercise of the principles and practice of the "Simple life" than does "America's experiment in the Orient." Employees must do their duty, their whole duty, and more than their duty. The intemperate, the immoral, the indifferent, and the fault-finding are a detriment to the plans and purposes of the government and should be made to give place to those who appreciate the high privilege of helping others.

While there are many discouraging features in the present and prospective view of the situation, there is no question or doubt of the ultimate success. The government will succeed, the board of health will succeed, and all who have added their help and influence to the great work will be counted as factors in securing to a people and to a country the blessings of true Americanism.

Very respectfully,

R. E. L. NEWBERNE,
Acting Chief Health Inspector.

THE COMMISSIONER OF PUBLIC HEALTH,
Manila, P. I.

REPORT OF THE SANITARY ENGINEER FOR THE PHILIPPINE ISLANDS.

MANILA, P. I., *August 31, 1905.*

SIR: I have the honor to submit herewith a report of the work accomplished by this division from September 1, 1904, to August 31, 1905, inclusive. During the fiscal year the sanitary engineering division has issued 1,336 orders pertaining to the city of Manila, as shown by the following tabulated statement:

Statistical report of the repair work of the sanitary engineering division.

ORDERS ISSUED

Month	Sanitary engineer division	Health district. No 1	No. 2.	No. 3.	No. 4	No. 5.	No. 6.	No. 7	Total.
1904.									
September	70	4	10	1		5	4		94
October	37	13	11	22			4	2	89
November	40	5	2	21	5	1	4	6	84
December	95	10	1	26			2	7	141
1905									
January	110	6	1	17	4	5	2	21	166
February	114	6	4	9	1	3	5	8	150
March	66	2	3	3			3	13	90
April	41	1		27			3	8	80
May	54	1		67			3	3	128
June	69	4		15			5	9	96
July	105	1		6		1	1	6	119
August	93	1		6		1	2	7	110
Total	888	54	32	219	10	15	38	90	1,336

ORDERS OBEYED.

1904.									
September	67	4	9			4	4		88
October	35	11	9	21		2	2	1	82
November	40	4	2	19	4	2	4	5	80
December	95	8	1	24			2	7	137
1905.									
January	100	6	1	14	4	5	2	19	151
February	103	6	3	8	1	2	5	4	132
March	56	2	1	2			3	8	72
April	35			26			2	8	71
May	25			64			3	3	95
June	31			13			3	9	56
July	10			5			1	6	22
August	93								93
Total	691	41	26	196	9	15	31	70	1,079

UNCOMPLETED ORDERS.

1904.									
September									
October							1		1
November					1				1
December									
1905.									
January	10								10
February	11		1					1	13
March	10			1			1		12
April	6			1			1		8
May	28								28
June	32	2		1			2		37
July	94								94
August	93	1		6				5	105
Total	284	3	1	9	1		5	6	309

Statistical report of the repair work of the sanitary engineering division—Continued.

ORDERS CANCELED AND DISAPPROVED.

Month.	Sanitary engineer division.	Health district.							
		No. 1	No. 2.	No. 3.	No. 4.	No. 5.	No. 6.	No. 7.	Total.
1904.									
September	3		1	1		1			6
October	1	2	2	1			1	1	8
November		1		2		1		1	5
December		2		2				1	5
1905.									
January				3	3			2	6
February				1		1		2	4
March				1				5	6
April		2					1		3
May	1			1					2
June				1					1
July	1	1							2
August									
Total	6	8	3	13	1	3	2	12	48

HOUSES RECOMMENDED CONDEMNED AND DESTROYED.

Month.	Health district.							
	No. 1.	No. 2.	No. 3.	No. 4.	No. 5.	No. 6.	No. 7.	Total.
1904.								
September			1		1			2
October	16			26				42
November			1		26		1	28
December		172	25					197
1905.								
January	1		27		3			31
February				18	4		16	38
March				1	3		1	5
April	12	8						20
May	1		1					2
June	65				1			66
July			47					47
August								
Total	95	180	102	45	38		18	478

PLANS FOR NEW BUILDINGS APPROVED.

1904.								
September	6	5	7	8	3		14	43
October	3	5	4	8	3	2	8	33
November	1	3	3	6	6	2	10	31
December	4		3	1	5	1	10	24
1905.								
January	4	4	2	2	6	1	4	23
February	3	2	4	4	7		12	32
March	4	6	4	10	10	1	18	53
April	3	2	6	5	4	1	6	27
May	5	3	4	6	8		9	35
June	6	3	9	3	7		12	40
July	1	2	2	3	2	1	4	15
August	1	4	1	5	4	1	7	23
Total	41	39	49	61	70	10	114	384

Statistical report of the repair work of the sanitary engineering division—Continued.

PROSECUTIONS FOR FAILURE TO COMPLY WITH SANITARY ORDERS.

Month.	Number prosecuted.	Amount of fines.
1904.		*Pesos.*
September		
October	1	150
November		
December	3	150
1905.		
January	9	330
February	6	270
March	4	115
April	3	90
May		
June	1	25
July	1	40
August	2	65
Total	30	1,235

PERSONNEL OF THE DIVISION.

Month.	Engineer.	Inspectors.	Clerk.	Translator.	Draftman.	Total.
1904.						
September	1	2	1	1	.....	5
October	1	2	1	1	.....	5
November	1	2	1	1	.....	5
December	1	2	1	1	.....	5
1905.						
January	1	2	1	1	1	6
February	1	2	1	1	1	6
March	1	2	1	1	1	6
April	1	2	1	1	1	6
May	1	2	1	1	1	6
June	1	2	1	1	1	6
July	1	2	1	1	1	6
August	1	2	1	1	1	6

The reasons for the issuance of these orders may be classified under the following heads, viz:

(*a*) Drainage. (*b*) Light and ventilation. (*c*) Disposal of human excreta. (*d*) Disposal of waste water. (*e*) Miscellaneous.

DRAINAGE.

During the past year this office has issued 304 orders requiring property owners to provide or repair gutters and 46 orders requiring that premises be filled sufficiently to insure proper drainage.

The ground on which the city of Manila is built is generally low and marshy. There is not a district in the city which at extreme high tide is not more or less flooded. The proper drainage of low lands under such circumstances is difficult and costly.

There are large areas of unimproved land, the owners of which are financially unable to fill their lots high enough to secure good drainage. In some cases the cost of filling would exceed the cost of the land. All of these undrained portions of the city, until raised above the level of the surrounding streets, will serve as breeding places for mosquitoes, and be a menace generally to the public health.

In case of new buildings the owners are required, before approval of plans, to sign an agreement to fill the lot with clean earth, sand, cinders, or gravel to the level of the sidewalk in front. In the older portions of the city the grades of the streets, through a process of accumulation and repair extending over centuries, have been raised from 12 inches to 24 inches above the basements of the houses located thereon. The drainage problem for these buildings is decidedly complicated. As the height of the lower story is frequently only 8 feet or less, the raising of the ground surface would probably render the ceiling too low for habitable purposes. If the ground

floor is raised, then the second story and roof must also be raised. This will, in many cases, cost more than removing the old structure and building a new one. Many of these properties are mortgaged, and the owners are too poor to renovate their holdings. Sometimes the question is further complicated by the owner of the building not being the owner of the land.

In view of the present poor facilities for the filling in of low land and of the high cost of same (₱2 per cubic meter), it is believed that no permanent relief from the present unsatisfactory conditions can be hoped for until the city of Manila takes the matter in hand and fills all low grounds sufficiently to insure proper drainage, charging the cost of same against the property in question.

LIGHT AND VENTILATION.

To clearly understand the difficulties of securing proper light and ventilation it is necessary to describe the different types of architecture in use in Manila. These types may be classified under four heads, viz, "Spanish," "native," "Chinese," and "American."

The Spanish type is usually a large two-story building of mixed materials; the plan is square, or approximately so, and the kitchen, closets, bath, stable, and servants' quarters are usually provided for in an annex running back from the main building, the kitchen, bath, closet, and "azotea" being directly above the servants' quarters, servants' closet, and stable. The "azotea" is a tiled or paved porch or veranda on the second story, usually not roofed, intervening between the main building and the kitchen. The second story is supported on "harigues" or uprights whose bottoms are embedded in masonry footings and whose tops extend to the ceiling. The walls of the lower story are of masonry and are built up so as to inclose the "harigues." The second story projects over the lower story from 2 to 8 feet. The lower story is provided with a paved entrance from 12 feet to 30 feet wide, extending from the front to the back door, which opens on the patio (yard). This, in addition to being the passageway for entrance to and exit from the building, is generally used as a carriage house. The front entrance is large enough to permit the entrance of horses and carriages, and is closed by massive doors, one of which is provided with a smaller door for the use of persons only. Between this paved space and the main walls on either side are the "entresuelos" or sleeping rooms, formed by constructing board floors at an elevation of from 2 feet to 5 feet above the ground surface of basement and by extending wooden partitions from ground to ceiling. One of the "entresuelos" is generally shortened sufficiently to provide space for the stairway to the second story. The ground under the "entresuelo" is not paved, and frequently serves as a breeding place for rats.

The second story is divided into the sala, or hall, the dining room, sleeping rooms, etc. The sala usually extends the whole length of the house and serves as a passageway to the other rooms, all of which usually open on it. The sides inclosing the second story are of wood and reach from the floor to the eaves. Wooden partitions fastened to the "harigues" extend from the floor of the second story to ceiling. The space between the exterior walls of the second story and the wooden partitions attached to the "harigues" serves as an outside gallery by means of which the different rooms can be reached without the necessity of passing through the sala. The floors of the sala and rooms upstairs are usually of polished, native hard woods, the walls and ceiling being elaborately painted. The entranceway and entresuelos are plainly finished. The windows of the lower story are protected by heavy projecting iron gratings.

The light and ventilation of the second story is generally good.

Most of the lots occupied by dwelling houses in Manila are surrounded by high stone walls, and on this account the entrance of light and air into the entresuelos, stable, servants' quarters, and remainder of the first story is more or less impeded. In some cases where buildings were originally constructed on large lots, portions of which have since been occupied by other buildings, the entrance of light is so obstructed that the portion under the "azotea" is dark even at midday. This lack of light and air is at times extremely difficult to remedy. Frequently the cutting of new windows and air shafts will entail a remodeling of the entire building.

Forty-eight orders were issued having for their object the improvement of the light and ventilation by providing extra windows, doors, etc.

Native types.—The nipa house, varying from the hut of the laborer to the commodious dwellings found in some of the districts, may be considered as essentially a native type. The roof is usually of nipa; the sides are of nipa or of woven caña bojo fastened to a framework of bamboo secured to wooden harigues. The floors are of boards or split bamboo. These houses are cool, well lighted, and ventilated.

Chinese types.—Apparently the end to which all Chinese strive to attain is to pack as many tenants into a house as it can possibly hold, and in order that these tenants may have a slight degree of privacy an ingenious system of floors and partitions is constructed which, while admitting the entrance and exit of the human occupants, almost totally excludes air and light. A case recently came under my observation where a storeroom 20 by 30 by 12 feet had by means of extra floors and partitions been divided in a lodging house containing 24 compartments.

Our usual remedy in such cases is to order all unauthorized floors and partitions removed, and 82 orders of this nature were issued.

American types.—The houses built by the Americans are generally of wood. They are of one or two stories, containing from two to eight rooms, and are provided with porches or verandas. Usually they are well lighted and ventilated.

DISPOSAL OF HUMAN EXCRETA.

During the year 221 orders were issued to repair tight vaults and 166 orders were issued to repair septic vaults; also tight vaults were approved for 69 new houses and septic vaults approved for 265 new houses.

The method of disposing of excreta in the Spanish type of house was by the absorbing cess pool. Some of these were fine specimens of their class Masonry vaults 20 feet square and extending up to the second story being not uncommon. Sometimes they were provided with outlets into closed sewers, into esteros, or into the Pasig River. The seats were generally of wood, although a few were provided with pan closets or antiquated flush closets. In some cases the closets on the second story were connected to the vaults by means of galvanized sheet iron or cement pipes, or by inclined masonry runs or slides. There was no arrangement provided for the cleaning of the vaults, and when one had to be cleaned an opening was made through the wall. An idea of how long these vaults were allowed to remain without cleaning may be gathered from the fact that as many as 8,500 gallons of human feces have been removed from a vault at one cleaning.

Practically all of the old vaults have been converted into tight vaults, properly vented, or into septic vaults by the addition of filter compartments filled with broken stone or gravel.

Many property owners have installed flush water-closets over old tight vaults, with the inevitable result that as soon as the vault becomes full of water, seepage through the walls takes place and a nuisance is the result. Defects of this nature are usually remedied by building a filter vault with overflow to street sewer or estero and connecting same to original tight vault.

It is deemed proper to state that no accurate record exists of either the public or private sewers formerly constructed in the city, with the result that to-day in the constructions and repair of sewers, streets, water pipes, etc., old sewers are constantly being broken into, causing more or less annoyance. Frequently our investigation to discover the cause of foul odors arising from alleys and from streets immediately in front of buildings proves that an old sewer, whose existence nobody was aware of, is the cause of the trouble.

Septic vaults.—As the present ordinance prohibits the entrance into the river or esteros of crude excreta, it became necessary to devise some method by means of which water-closets could be installed and operated, and which would at the same time dispose of the surplus water. This has been done by means of the septic vault, consisting of a tight receiving compartment and a filter compartment, filled with loose broken stone or gravel; the discharge from filter vault to go into the river, into an estoro, or into a covered sewer, if such connections be possible. In some portions of the city where the soil is suitable for absorption, septic absorbing vaults, without any discharge, have given satisfaction.

The use of these septic vaults has, on the whole, proved satisfactory, the effluent in some cases being clear and odorless. In several cases where no septic action has taken place, the effluent has been dark-colored and offensive. This difficulty arises probably from the fact that in order to secure proper septic action the feces must bear a certain proportion to the liquids. If either the liquids or the feces are in excess, septic action is delayed or prevented, and the effluent is discolored and foul smelling. Where a vault would give satisfactory results for the feces from five persons, it is possible that the result for double that number would not be so good.

Pail system.—It is the policy of this office to approved of the use of the pail-conservancy system of the city of Manila for (a) temporary use; (b) for small tenements; (c) for groups of houses, none of which are provided with adequate closet systems; (d) for those buildings with old, unauthorized vaults, to change which to one of the systems approved by the board of health would entail too great an expense.

DISPOSAL OF WASTE WATERS.

During the year this office has ordered 79 absorbing basins constructed or repaired, and has approved the plans for 123 new buildings provided with absorbing basins.

Waste water from kitchens, baths, and stables is usually disposed of in absorbing basins. Where the ground does not absorb well a discharge is provided, if practicable, from absorbing basins to the river, to an estero, or to a street sewer, or a street gutter, provided the street is paved. In some parts of Manila where the ground water is too near the surface to admit ot absorbing basins giving satisfactory results the waste water is allowed to enter street gutters direct. This is also permitted in case of small tenement houses where the amount of water used is relatively small, and where the expense of constructing an absorbing basin would be out of proportion to the cost of the building.

In many houses the waste water from kitchens and baths is allowed to fall through the floor on the ground underneath, there to evaporate, to absord, or to form puddles. To remedy this defect we have issued 129 orders requiring the kitchens and baths to be tiled, or the ground underneath to be paved or tiled. Also it is the belief of the board of health that concreting or paving the ground surface of a building is the best protection against rats. This has been insisted upon by the sanitary engineer before approving plans for new buildings.

In many of the old buildings the water from the azotea is allowed to escape over the edges and run down the sides of the walls underneath, discoloring them and leaving grease and slime deposited thereon. To remedy this we have issued 487 orders requiring bell traps and down spouts to be installed.

MISCELLANEOUS.

The general use of open fires unprovided with adequate smoke flues or chimneys has caused the ceilings and walls of most of the kitchens to become blackened by soot and smoke. To remedy this we have ordered 160 smoke hoods to be repaired or constructed in old houses, and have required all new houses having open fireplaces to be provided with smoke hoods of the design approved by this office. The increasing use of cooking stoves in the better class of houses is a decided improvement over former conditions.

It is customary where smoke hoods are installed to require the ceilings and walls of kitchens to be thoroughly cleaned and whitewashed, also wherever living quarters are dirty and the walls discolored and greasy we require that same be cleaned and whitewashed.

During the past year we have issued 224 orders requiring premises to be whitewashed either wholly or in part.

In addition to the nature of the repairs above described we have issued many orders of a miscellaneous character, such as requiring closets, baths, sinks, pipes to be repaired, premises to be cleaned, stables to be moved, chickens, pigs, and other animals to be taken out of living quarters, etc.

HOUSES RECOMMENDED CONDEMNED AND DESTROYED.

Four hundred and seventy-eight houses were recommended to the municipal board for condemnation and removal.

This office has proceeded very slowly in recommending the condemnation and removal of buildings for the reason that the houses to be condemned are generally occupied by the poorer classes, and to remove any large number at any one time would cause distress and suffering, the people being without adequate means for securing shelter for themselves and families. It can be safely asserted that if all the buildings in Manila unfit for human habitation and not worth the cost of repairs necessary to make them so, were removed that a large per cent of the city's population could not be sheltered until new houses were built. It is the policy of this office to recommend buildings for condemnation only where they have reached such a stage of decay that they are not worth the expense of repairing them, and then only in limited numbers.

PLANS FOR NEW BUILDINGS APPROVED.

During the year this office has examined and approved the plans for 384 new buildings.

It is our desire that every new building constructed shall conform to the standard of sanitary requirements as established by the best sanitarians, engineers, and architects of Europe and America, with certain necessary changes to suit the different climatic conditions. As works written in Spanish treating of architecture and sanitation are difficult to obtain, and as the local architects adhere rigidly to the prevailing type of buildings, our efforts have not been as satisfactory as we could have wished.

PROSECUTIONS FOR FAILURE TO COMPLY WITH SANITARY ORDERS.

For noncompliance with sanitary orders thirty owners or agents of property were prosecuted and fined. As the entire system of disposing of human excreta, waste water, etc., at present in use in the city of Manila will be changed as soon as the new sewer system is completed, it is the policy of this division to overlook many irregularities on the part of the property owners or agents, provided their premises are kept in a reasonably sanitary condition, and only to prosecute for noncompliance with necessary orders when it has become evident that gentler methods will not avail.

NECESSITY FOR NEW LAWS.

The city of Manila at present has no sanitary code, and as a result the people are ignorant of sanitation and a large part of our own time is occupied in making explanations which should be given by the sanitary code.

We have no ordinance clearly defining the requirements of good plumbing, and as a result there is a lack of uniformity in plumbing work and a disposition on the part of certain plumbers to evade or disregard the orders emanating from this office, knowing, as they do, that at present the prosecution of plumbers for installing inferior and defective work is extremely difficult.

Our building ordinances are defective and do not meet modern requirements. On this account there has been in past times more or less of a tendency not to enforce them strictly, leaving the architect or contractor to construe the law to suit himself, and the precedent thus established still retards our efforts to secure better buildings.

It is believed that the enacting of the three ordinances above enumerated, all of which are at present under consideration, would be of inestimable value to the public and would relieve this office from the necessity of making long and wearisome examinations, which at present occupy entirely too much of our time.

PRESENT FORCE AND ORGANIZATION.

At present the city of Manila is divided into seven health districts, as follows:

Districts.	Houses.	Population.
San Nicolás, Binondo	4,590	45,702
Tondo	6,392	39,043
Sampaloc	3,361	27,606
Ermita, Malate, Paco	9,928	34,087
Intramuros	696	11,460
Santa Cruz	4,933	35,080
Quiapo	1,887	11,130
In boats	.....	15,901
Total	31,787	219,928

To inspect these we have: 1 sanitary engineer, 6 district medical inspectors, 8 sanitary inspectors (2 of these are in the office of the sanitary engineer), 9 assistant sanitary inspectors, 16 sanitary police.

The police, who are detailed for the purpose by the city, are required to inspect the houses in their district at least once a month, and to see that the premises are kept clean. Whenever a building is reported in need of repairs by the police the sanitary inspector of that district makes an inspection, and if conditions justify it he fills out board of health Form No. 56 stating the condition of the premises, and recommends the necessary repairs. This form, after approval by the medical officer in charge of the district, is forwarded to the office of the sanitary engineer, who makes or causes another inspection to be made before an order is served on the owner, directing that the necessary repairs be made within a specified time.

It is believed that more efficient service can be secured and a higher state of organization be attained by having the police report direct to the sanitary engineer, from whose office a final inspection would be made before ordering repairs. As all orders for repairs, cleaning, etc., are served by the sanitary police, it would be easy, by requiring them to note all corrections made in their reports, to teach them to exercise better judgment in rendering the same.

The sanitary police should be men permanently detailed for this work, and after perfecting themselves in their duties they should not be removed without just cause; however, it is believed that it would be more satisfactory to increase the number of assistant sanitary inspectors instead of using the police for this purpose.

The sanitary inspectors should all be under the direct orders of the sanitary engineer. In this manner they could be more readily trained and could be used to good advantage in training the assistant sanitary inspectors and the sanitary police. As the sanitary police and assistant sanitary inspectors become more efficient, the number of sanitary inspectors could be gradually diminished. At present the sanitary inspectors and assistant sanitary inspectors have their time largely occupied in clerical work at their respective stations.

None of the present sanitary inspectors speak Spanish or Tagálog sufficiently to make themselves clearly understood, and as most of their business is transacted with people who do not understand English, some unfortunate misunderstandings have occurred. It is recommended that an increase in salary be granted to those who can pass a satisfactory examination in Spanish or Tagálog, and that in like manner, an increase of salary be granted the assistant sanitary inspectors and the sanitary police who pass a satisfactory examination in English.

WORK DONE OUTSIDE CITY OF MANILA.

CULION LEPER COLONY.

The work done by this division at Culión consists of: 1, surveying and platting the ground: 2, designing and locating a system of water supply; 3, designing and locating a sewer system.

SURVEY OF LEPER COLONY AT CULION AND OF DIRECTOR'S DWELLING AT CARTERS.

This work was performed by the sanitary engineer, assisted by Sanitary Inspector Sidell, during the month of March, 1905. The results of the survey were platted in the office of the sanitary engineer.

WATER SUPPLY.

The water with which the colony is to be supplied comes from a spring outside the space reserved for the lepers. The flow of the spring has been determined by Doctor De Mey, the director, to be about 20,000 gallons per day. The water is clear and exceptionally pure.

It is purposed to raise the water up to a reservoir and then convey it by gravity, through a system of pipes, to different points in the colony.

The system as located consists of: (1) A cement tank which receives the water direct from the spring; (2) a pumping engine; (3) 618 feet of 2½ inch galvanized iron supply pipe leading to the reservoir; (4) a reservoir, consisting of a vertical cylindrical opening in the side of a hill, which is lined on sides and bottom with concrete and covered with a layer of concrete resting on a platform of "molave." The capacity of the reservoir is 80,000 gallons; (5) a 4-inch galvanized iron water main for conducting water to colony, and a series of 2½-inch, 2-inch, and 1-inch galvanized iron branches for distributing to hydrants, baths, closets, hospital, kitchens, and fire plugs.

The director's dwelling at Carters is also provided with water which is pumped up to a reservoir and from there conducted by gravity to the dwelling.

SEWER SYSTEM.

The sewer system as designed and constructed consists of a series of 4, 6, and 8 inch branches of cement pipe connected to the main 8-inch cement sewer, which discharges into a septic vault, the overflow of which goes into the sea. The main sewer is provided with three manholes. The sewers are ventilated through the manholes, whose covers are perforated. On account of the steep lay of the land there was no difficulty in securing good grades for all sewers. It is believed that the system as designed and constructed will effectually dispose of all sewage from closets, baths, hydrants, kitchens, and buildings.

As the nature of the ground would not permit of two of the closets being connected to the main sewer system it was decided best to construct two small septic vaults for this purpose, each receiving the discharge from one closet.

The director's dwelling at Carters and the employees' dwellings at the Spring are also provided with small septic vaults.

Very respectfully,

J. D. FAUNTLEROY,
Sanitary Engineer for the Philippine Islands.

The COMMISSIONER OF PUBLIC HEALTH,
Manila, P. I.

REPORT OF PHYSICIAN IN CHARGE OF SAN LAZARO HOSPITALS.

MANILA, P. I., *September 1, 1905.*

SIR: In compliance with special instructions from your office, I have the honor to submit my third annual report, which covers the work performed by the several departments of the San Lázaro Hospitals during the year ending August 31, 1905.

Before taking up each department separately, it may be stated that the general personnel and scope of work carried on at this hospital remain practically the same as set forth in my last report, with the exception of the transfer of the women's department, on December 9, 1904, to a suitable building in Sampaloc district, city of Manila, and the conversion of the building thus vacated into an insane department.

In view of the comparatively short time that the women's department remained here since my last report and of the fact that all of the records pertaining to this department were transferred to the new Sampaloc Hospital, this report will not include the women's department, except as to such data, in a general way, as pertains to the total number of patients admitted, subsisted, and discharged during the period while it was here.

IMPROVEMENTS AND CHANGES.

The following changes, additions, and improvements to the buildings, equipment, and grounds have been made during the past year:

1. An excellent Leitz microscope has been furnished us and a small laboratory provided for emergency work. This has been a wonderful aid to the work of the several departments of the hospital, as well as a benefit to the physicians on duty here.
2. The conversion of the building formerly occupied by the women's department into wards for the insane.
3. The erection of a new stable to accommodate the ponies used in the hospital carretela and carromata, and the Australian horse used in the dump cart.
4. Remodeling the morgue tables and the construction of a cold storage for dead bodies.
5. Construction of a suitable laundry for the leper department.
6. Installation of a Rider-Ericson hot-air engine for pumping water from the city main into our hospital tanks. This is necessary during the dry season when the water pressure is low.
7. The addition of a new portable disinfecting plant to our equipment for use in case of an epidemic of any kind.
8. The construction of a poultry yard, where we are attempting to raise chickens to supply fresh eggs for the hospital wards.
9. General improvements to grounds, filling in and grading low places, and planting grass and trees. Practically all of the extensive grounds around the hospitals have been graded and sodded and are regularly cut by lawn mowers.

REPORT OF SICK.

The number of sick treated in the several departments of this hospital during the past year has been as follows:

	Patients.
Brought forward September 1, 1904	331
Admitted during year	513
Discharged during year	376
Died during year	106
Transferred during year	55
Escaped (lepers)	5
Remaining August 31, 1905	302

NUMBER OF PATIENTS.

The average number treated per day during this period was 306, being for September, 307; October, 300; November, 281; December, 285; January, 297; February, 308; March, 317; April, 321; May, 322; June, 317; July, 307; August, 301.

COST OF SUBSISTENCE.

The average cost of subsistence per patient per day was, for September, ₱0.36; October, ₱0.35; November, ₱0.40; December, ₱0.39; January, ₱0.34; February, ₱0.36; March, ₱0.38; April, ₱0.36; May, ₱0.36; June, ₱0.36; July, ₱0.35; August, ₱0.37—all in Philippine currency.

DEPARTMENTS.

The following is a summary of the work performed by each of the departments during the period from September 1, 1904, to August 31, 1905:

WOMEN'S DEPARTMENT.

As above stated, this department was transferred to its new location in Sampaloc district on December 9, 1904, and a report covering the details of its operation for the entire year will be submitted separately by the physician in charge.

INSANE DEPARTMENT.

The opening of this department was a step toward filling a very urgent and long-felt need, which had been recognized by many of us since our early occupation of these islands. The Hospicio de San José had been overcrowded for two years, and the only available place where this unfortunate class of people could be detained to prevent their inflicting injury upon themselves or others was Bilibid Prison. There they were received in the prison hospital, being committed by the courts or executive order for detention until cured or otherwise disposed of.

On November 13, 1904, 30 of these insane people were transferred from Bilibid Prison to this hospital, of which number 24 were males and 6 were females; of the males 1 was an American, 2 were Spaniards, while the remaining 21 were natives. All of the females were natives. Of the total, 25 were detention cases, having been committed on account of insanity, while 5 were insane criminals, with sentences varying from six months for theft to death sentence for parricide. The prisoner sentenced to death was transferred here in shackles, which have since been removed, the supreme court having reduced his sentence to life imprisonment on account of insanity.

As now arranged, the insane department can accommodate 15 women and 75 men, or a total of 90 persons. The ward for women has been filled almost constantly, while the male wards are almost full, and provisions should be made in the near future for increasing the capacity of this department.

The personnel of this department consists of 3 American nurses, receiving $60 United States currency per month; 1 native, receiving $15 United States currency per month, and 5 natives, receiving $7.50 United States currency per month.

Below is a table showing the cases treated in this department since it was opened in November:

	Total admitted.		Discharged cured		Transferred.		Died.		Remaining.	
	M	F.	M	F.	M	F	M.	F.	M.	F
American	5	1	1	0	2	1	0	0	2	0
European	4	0	2	0	0	0	0	0	2	0
Chinese	3	0	2	0	0	0	0	0	1	0
Japanese	0	1	0	1	0	0	0	0	0	0
East Indian	1	0	0	0	1	0	0	0	0	0
Filipino	76	25	17	9	0	1	12	2	47	13
Egyptian	1	0	0	0	0	0	0	0	1	0
Others	1	0	0	0	0	0	0	0	1	0
Total	91	27	22	10	3	2	12	2	54	13

Of the 12 males that died the diagnoses were as follows: Pneumonia, 1; chronic dysentery, 1; chronic interstitial nephritis, 1; general inanition, 1; senility, 1; chronic hemorrhagic leptomeningitis, 1; abscess of iliac region, 1, and beri-beri, 4. The 2 females died of chronic nephritis.

Table showing diagnoses of cases treated:

Melancholia	46
Delusional insanity	12
Dementia	9
Epilepsy	6
Imbecility	4
Catalepsy	1
Paranoia (degenerate)	2
Mania	3
Temporary insanity (alcoholism)	2
Undetermined	33
Total	118

LEPER DEPARTMENT.

The general routine of this department continues with but little change since my last report. Doctor Mercado, as before, continues to do the medical work on the wards and the patients seem unusually cheerful and contented for people under life sentence.

Since January, 1904, the physician in charge, with the assistance of Doctor Mercado and one of our trained nurses, has been engaged in doing some special work in this department. We have attempted to get histories of all cases, classify them as to the variety, examine them microscopically for the lepra organism, and in some selected cases we have tried various curative measures. Some of this work has been written up by the physician in charge and may be published when completed, but I think it is safe to say that we have found many of these cases to have been benefited by the application of the X ray, while 3 of them have been actually cured by this treatment. In all of this work our diagnoses and results from treatment were followed and confirmed by microscopical examinations. Also, we have attempted to keep a photographic record of results obtained.

The following table shows the number of cases treated in this department during the past year:

Remaining in hospital September 1, 1904	225
Admitted during the year	69
Died during the year	57
Discharged, diagnosis not leprosy	4
Discharged to go to China	1
Escaped	5
Remaining August 31, 1905	227

As will be seen, the number of escapes is only 5, which to me indicates a marked increase as to contentment among these poor unfortunates, especially when it is compared with previous reports, which gave 16 for last year and 46 for the year before. The causes of death have been the ordinary intercurrent diseases, especially chronic enteritis, general debility, heart disease, tuberculosis, etc.

CONTAGIOUS DISEASE DEPARTMENT.

During the most of the past year the work in these departments has been comparatively light, there being occasional cases of bubonic plague, smallpox, and tetanus, but no tendency to an increase of these diseases to any marked extent. On August 21, 1905, we received our first case of cholera for the year, since which date cholera has gradually increased, but as yet it is too early to obtain any information of value for this report.

BUBONIC PLAGUE DEPARTMENT.

The following table shows cases treated during the past year:

	Remaining last report.	Admitted.	Discharged (diagnosis not plague).	Transferred.	Died.	Cured.	Remaining.
1904							
September	0	1	0	1	0	0	0
October	0	0	0	0	0	0	0
November	0	0	0	0	0	0	0
December	0	0	0	0	0	0	0
1905							
January	0	1	0	0	0	0	1
February	1	3	1	2	1	0	0
March	0	3	0	0	2	0	1
April	1	1	0	0	0	0	2
May	2	3	1	0	1	2	1
June	1	3	1	0	2	0	1
July	1	3	1	0	3	0	0
August	0	4	0	2	2	0	0
Total	.....	22	4	5	11	2	.....

SMALLPOX DEPARTMENT.

The following table shows cases treated during the past year:

	Remaining last report.	Admitted.	Discharged (diagnosis not smallpox).	Transferred.	Died.	Cured.	Remaining.
1904							
September	0	5	0	0	1	1	3
October	3	0	0	1	2	0	0
November	0	1	0	1	0	0	0
December	0	2	0	0	0	0	2
1905							
January	2	4	0	0	0	4	2
February	2	6	0	1	0	4	3
March	3	4	0	0	0	4	3
April	3	4	0	0	0	4	3
May	3	2	1	0	0	2	2
June	2	3	0	0	1	1	3
July	3	2	0	1	0	3	1
August	1	0	0	0	0	0	1
Total	.....	33	1	4	4	23	.....

CHOLERA DEPARTMENT.

	Remaining last report.	Admitted.	Diagnosis not cholera.	Died.	Cured.	Remaining.
August	0	28	3	18	0	7

As will be seen, no cases of cholera were treated during the year until the month of August. During most of the year the wards of this department were used for miscellaneous cases, during which period we treated 5 cases of tetanus, 1 case of impetigo, 1 case of acute entero-colitis, admitted as cholera; 1 obstetrical case and the baby resulting therefrom. Two out of the 5 cases of tetanus recovered. These 2 cases were treated by Doctor Biggar during my absence in the United States.

MORGUE AND CREMATORY REPORT.

The following table shows the number of bodies received and the causes of death, by months:

	Bubonic plague.	Small-pox.	Leprosy.	Violence.	Cholera.	Other causes.	Total.
1904							
September	1	2	4	1	0	12	20
October	0	2	4	0	0	9	15
November	0	0	1	0	0	9	10
December	2	0	6	0	0	22	30
1905							
January	6	1	7	3	0	14	31
February	4	0	3	1	0	30	38
March	8	0	2	0	0	24	34
April	2	0	1	2	0	17	22
May	2	0	3	0	0	25	30
June	6	1	3	1	0	29	40
July	3	0	9	2	0	14	28
August	3	0	10	3	26	35	77
Total	37	6	53	13	26	240	375

Autopsies held during the year, 181; bodies cremated during the year, 54; buried as paupers during the year, 214.

In conclusion, I wish to state that between the 6th of March, 1905, and the 30th of June, 1905, during the absence of the physician in charge in the United States, Dr. J. H. Biggar acted in that capacity and carried on the work with unusual ability. Dr. H. C. Bierbower is now doing special work in the cholera department and considering the severity of most of the cases of cholera, his results so far have been excellent.

Very respectfully,

H. B. WILKINSON,
Physican in Charge.

The COMMISSIONER OF PUBLIC HEALTH,
Manila, P. I.

SOME OBSERVATIONS ON LEPROSY IN THE PHILIPPINE ISLANDS WITH AN ACCOUNT OF ITS TREATMENT WITH THE X RAY BY H. BROOKMAN WILKINSON, PHYSICIAN IN CHARGE, SAN LÁZARO HOSPITALS.

MANILA, P. I., *September 30, 1905.*

As is generally known, leprosy is diffusely scattered throughout the entire Archipelago, not being much more abundant in any one locality than in another. The actual number of cases is variously estimated from 5,000 to 10,000. Whether the disease is increasing or decreasing at the present time, can hardly as yet be even surmised, nevertheless we do know that in the neighborhood of Manila, where for several years an attempt has been made to segregate it in this hospital, we are constantly receiving new or previously unreported cases. The new admissions during the past three years since I have been in charge of the hospital, have been variable as to the apparent stage of the disease, but it is extremely rare to find a case where the disease is limited to so small a localized region of the body as to indicate recent local infection. On the other hand, a large proportion of new admissions give an undoubted history of the disease dating back from one to ten years, from which fact I am sure that practically all of them could have been diagnosed earlier had they been examined by an experienced physician. It is also quite probable that we are surrounded by, and more or less in constant contact with, numerous cases of leprosy in its early stages of development.

It is practically impossible to draw any reliable conclusions as to the exact duration of the disease in any given case on account of the general ignorance of the masses with reference to its early recognition and differentiation from numerous other skin diseases so common here, as well as to their lack of fear of the disease and their consequent inclination to conceal its presence in order to avoid segregation or confinement. Also the point of inoculation or the source of infection can rarley, if ever, be determined on account of our inability to locate the cases at an early stage of the disease, or to ascertain the approximate time of infection. These difficulties are in-

creased by the customs of the natives which disposes them to frequent change of residence and association as well as by the fact that anywhere they happen to go they are liable to find one or more sources of infection in the immediate neighborhood.

While from the above remarks it can be seen that the exact method by which this disease spreads is very doubtful, still there have been a few facts noted among our cases which throw some light upon the subject.

First, we find that for several years past there has been only 1 case where a husband and wife have been known to have the disease, and in this case the disease appeare l at the same time in both, indicating a common origin rather than a transfer from one to the other.

Of numerous children born in the Philippines of leprous parents (7 in this hospital, 3 having both parents leprous, but not married) none have been known to suffer with leprosy.

I have been able to locate 5 cases where a parent and child have both had the disease, but the development occurred toward the end of the child's adolescence, appearing at about the same time in both parent and child, the child developing the disease first, in 3 cases; the parent first in 2 cases, thus indicating common origin and not transmission from parent to child.

We have had 5 families represented by 2 children, 3 families represented by 3 children, and 1 family represented by 5 children. In this latter family there were 10 children; the other 5 with both parents remain free from the disease.

From these facts I am inclined to believe that the disease is rarely, if ever, transmitted from parent to offspring, and is with difficulty transferred directly from one person to another, but there frequently exists a common source of infection to which the members of the same family may be subjected, especially during early childhood.

For the purpose of the following comparative observations, I have taken the histories of 239 cases, 238 of which were in the hospital at the time when these statistics were prepared—December, 1904—while the other case was admitted soon afterwards and is included on account of its subsequent improvement and cure under X-ray treatment. As can be readily understood many difficulties were encountered in obtaining accurate histories of these cases, the principal of which being the variety of languages spoken—Spanish, Tagálog, Ilocano, Visayan, and Bicol being represented—and the sluggish mental condition of many of the patients, due to their station in life and their long, hopeless confinement. In this work, as well as in the microscopial examinations of slides and the use of the X-ray apparatus, I have been efficiently assisted by Dr. Rizal Mercado, the house physician, and by Miss R. Mickle, one of our trained nurses, both of whom kindly volunteered their services.

With each case we carefully inquired into the history of the development of the disease, especially with reference to the time when the first symptoms appeared, the time spent in this hospital, and the existence of the disease in relatives. Then an examination was made of the present condition of the body, noting the parts involved, the class or variety of the disease, whether hypertrophic, atrophic, or mixed, the amount of disfigurement estimated in per cent of disability, and the percentage of vitality. Ordinarily, vitality and disability would vary inversely one with the other, but disability is here used to mean the disability caused by the maiming action of this particular disease, while vitality is used in its ordinary general sense.

After this procedure, microscopical slides were made of scrapings from the specific lesions and in all cases found negative by the first slide; three additional slides were more carefully made and examined. If these slides were not positive, for the purpose of classification we called the case bacteriologically negative, although in most cases we carried the work further for the purpose of reconfirming the negative examination.

In the classification of the varieties of this disease, I have used the terms hypertrophic and atrophic in place of the more ordinarily used terms tubercular or nodular and neurotic or anæsthetic, as I find that these latter terms are liable to much confusion as well as being, in fact, misleading. Under the head of hypertrophic cases we include cases showing tubercles and nodules or mass and plate-like increase of tissue, while under atrophic we include those cases showing scars and glossing of skin, anæsthetic patches, wasting away of the fingers and toes, etc.; in other words, when hypertrophy exists we call the variety "hypertrophic," and when atrophy exists we call it "atrophic."

The hypertrophic forms develop most rapidly and are usually diagnosed earlier; they ulcerate freely and promply, and the lepra bacilli are easily found in great abundance in all cases by simply taking a scraping from any of the hypertrophied parts. The atrophic forms develop more slowly, rarely if ever ulcerate; the bacilli are found

with difficulty in scrapings, and the patients display the greatest variety of deformities, with frequent loss of toes and fingers.

The mixed variety is simply a combination of the other two, usually one form being apparently of much more recent origin than the other two.

Of the 239 cases here reported 97 are hypertrophic, 47 atrophic, 92 mixed, and 3 undetermined, 1 of the latter being probably atrophic and 2 not leprosy at all, but lupus vulgaris. Of the entire number the disease has existed to an extent to be recognized for an average period of 8.11 years and the average period of their residence in this hospital has been 2.55 years. Seventy-seven of the cases have had the disease for ten or more years, 12 for twenty or more years, 1 for 31 years, and 1 for 41 years. Seven have been in this hospital for ten or more years, 2 for 17 years, and 1 for 18 years. Of the 47 atrophic cases I find that the average time which they have been known to have had the disease has been 12.28 years, while their average time in this hospital has been 4 years.

The average estimated disability or deformity for the entire 239 cases is 53 per cent; 12 show no disability; 96 show less than 50 per cent disability; 37 show 50 per cent disability; and 94 show more than 50 per cent disability.

The average vitality of the entire number is estimated at 68 per cent. There are 5 with 100 per cent vitality, or practically normal, 158 with more than 50 per cent, 56 with 50 per cent, and 20 with less than 50 per cent vitality.

On microscopical examination of scrapings from the leprotic lesions I found 193 positive for lepra bacilli by the first slide taken and 46 negative. Subsequently I made three slides from each of these 46 negative cases and found 20 of them positive, there remaining 26 permanently negative for lepra bacilli in scrapings from the skin. I have made numerous subsequent examinations of many of these negative cases and continue to find them negative, but in a few cases who have died since I have been able to demonstrate the bacilli in nerves which supply the atrophied regions of the body. It is interesting to note that all of these 26 permanently negative cases belong to the atrophic variety except 3. One of these 3 is classed as doubtful, but I am inclined to class it as atrophic, while the other 2 are probably lupus.

X-RAY TREATMENT.

The treatment of leprosy with X rays was begun by me in this hospital in January, 1904. The apparatus used is a 10-inch spark machine, made by W. Watson & Sons, 313 High Holborn, London, with a variety of tubes supplied by the same firm. The bifocal tube exhausted for a 10-inch spark has given the most satisfaction.

In treating the cases I have always selected the part of the body which presented the greatest amount of leprotic deposit and usually exposed it to the rays for ten minutes at a distance of 7 to 10 inches; the distance and time of exposure being varied somewhat from time to time, an effort being made to approach as near to the point of burning the skin as possible without actually doing so. In only 2 cases was the skin actually burned, and it is interesting to note that they are the first 2 cases herein reported as cured. During treatment the patient never suffers and can only notice a slight tickling sensation over the area treated, as if a slight wind was blowing upon the skin. After two or three successive treatments a blushing of the skin may or may not be noted, and usually a sensation of itching is experienced by the patient. Should superficial burns occur treatment should be for the time suspended until tissue repair begins. These burns have shown little tendency to progress and have healed readily, leaving little or no scar.

Below will be found a tabulated list of 13 cases treated during the past year. All of these cases have been natives of the Philippines, and are numbered from 1 to 13 for easy reference.

No.	Sex.	Age.	Duration of disease, years.	Number of treatments.	Date of treatment.	Result.
1	F.	15	9	44	Jan. 31, 1904 Jan. 23, 1905	Not improved.
2	M.	8	1	13	Apr. 23, 1904 Nov. 21, 1904	Do.
3	M.	8	5	11	Apr. 23, 1904 Nov. 21, 1904	Improved.
4	F.	10	3	12	Apr. 23, 1904 Nov. 21, 1904	Not improved
5	M.	37	1	14	Apr. 11, 1904 Sept. 8, 1904	Cured.
6	F.	12	5	40	Sept. 10, 1904 Feb. 1, 1905	Improved.

No.	Sex.	Age.	Duration of disease years.	Number of treatments.	Date of treatment.	Result.
7	F	14	4	37	Sept 10, 1904 Jan. 23, 1905	Improved.
8	M.	13	4	38	Sept 10, 1904 Jan. 23, 1905	Do.
9	F.	12	7	14	Oct. 25, 1904 Jan. 23, 1905	Do.
10	M	16	5	12	Oct. 27, 1904 Jan. 20, 1905	Do
11	M.	36	18	15	Oct. 27, 1904 Jan. 17, 1905	Do,
12	M	19	2	52	Jan. 9, 1905 June 7, 1905	Cured.
13	M	25	2	14	May 8, 1905 June 7, 1905	Do.

As will be seen by an examination of the table of the 13 cases treated, 3 have been cured, 7 improved, and 3 not improved.

I am unable to entirely explain why cases 1, 2, and 4 were not improved by the treatment, still in none of these cases did we have a large mass of leprotic tissue to which we could apply the rays Case No. 1 had a few patches scattered over the face and body, and while the individual patches to which the rays were applied improved slightly, the disease apparently continued to progress in other parts of the body. Cases Nos. 2 and 4 had practically no localized patches and the treatment was stopped after a short, unsuccessful trial.

Cases Nos. 3, 6, 7, 9, and 10 showed definite improvement with considerable decrease in leprotic deposit, the advance of the disease being apparently for the time checked. Case No. 10 showed marked decrease of facial hypertrophy, but at the same time a loss of general health, possibly due to an overdosage of necrotic elements.

Cases Nos. 8 and 11 were both unusually far advanced and badly disfigured, and both improved to a marked degree, not only in parts of the body exposed to the X rays, but in distantly removed parts of the body where the rays did not reach. Case No. 11 had enlarged and ulcerated ears, lumps on face, enlarged, thickened, and ulcerating hands, with loss of the ends of several fingers. After the application of the rays to his hands where the tissue showed the greatest hypertrophy, not only did his hands decrease in size and the skin clean off, but the ears became smaller, the ulceration healed, and the skin of the face became more normal. Case No. 8 showed very unusual nodular developments over face. With treatment these nodules gradually disappeared to a very marked extent September 23, 1905. This gradual improvement in case No. 8 seems to be progressing, if anything, more rapidly at this time, September, 1905, than at any previous time, although treatment has been suspended since January.

Case No. 5.—Domingo Panol, male, native, of medium size, 37 years of age, admitted July 29, 1904; clinical diagnosis, well-developed hypertrophic leprosy. On the day of admission duplicate slides were made from skin scrapings and were sent to the government laboratories, both of which were reported positive for lepra bacilli.

History notes.—On admission the patient appears fairly well nourished. Talks Spanish unusually well and is much above the average in intelligence. He has been employed in the United States Quartermaster's Department as a laborer. The right side of his face shows marked thickening of the skin and superficial tissues, the entire surface being elevated about one-half to three-quarters of an inch and of a deep purplish-red color. The thickening of tissue is so great that his right eye is practically closed and the right ear two and a half to three times its normal size. On the point of the chin there is a nodular enlargement about the size of a horse chestnut. On the forehead, the left cheek, the chin, the neck are numerous small nodules about the size of an English split pea.

August 11: X-ray treatment was begun to-day, the application being the rays from a bifocal tube at a distance of 10 inches for ten minutes.

August 23: Treatment as on August 11 was repeated on August 12, 13, 15, 16, 17, 18, and 23. On examination to-day I find that the tumefaction of the face is markedly reduced and the right eye can be more widely opened. Superficial ulceration or burns have appeared on the helix of right ear and on the eminence of right cheek, from which runs a sero-purulent fluid. Treatment is for the time suspended.

August 31: The superficial burns have somewhat increased in size since last treatment and a tendency to break down is noted in the nodule on chin and on side of neck.

September 4: The burns have dried over and are covered with scabs or crusts. X-ray treatment is resumed.

September 9: There is still a superficial burn about the size of a 25-cent piece on the eminence of right cheek. The ear, chin, and neck are better. X-ray treatment was given on September 4, 7, and 8, but has now been discontinued.

September 22: The burns on cheek and chin alone remain and they are nearly well. Face and ear are much reduced in size and all of the nodules heretofore noted, and also two or three on arms appear to be gradually disappearing. The large nodule on chin is much reduced in size.

October 15: Patient has gradually improved. Most of the hypertrophy of face and ear has disappeared, leaving considerable scar tissue. The eye is now wide open and the outer canthus begins to be drawn outward by scar tissue. Right ear still somewhat enlarged, especially the lobule. Pus taken from the partly broken down nobule on chin shows lepra bacilli.

November 7: Right ear, especially its lobule, still somewhat enlarged. Face shows some inflammatory and much scar tissue. Chin shows some of the small nodules, but the large one has practically disappeared.

December 15: Skin scraped from cheek shows a few scattered lepra bacilli. Also skin and serum taken from healed nodule on chin show a few scattered imperfectly stained, apparently beaded and broken-up lepra bacilli. Pus and serum from crust on right ear shows no lepra bacilli. Patient is rapidly improving, so far as his leprotic manifestations are concerned, but his general physical condition is not good, and he seems to be losing in general health.

January 12, 1905: Three days ago a soft, indolent, fluctuating abcess appeared in the right groin above Poupart's ligament, and on being opened to-day discharged about eight ounces of yellow, thick pus. Microscopical examination of this puss shows numerous streptococci, but no lepra bacilli.

January 19: Improvement in face and ear plainly shown.

February 2: Microscopical examination of skin and serum taken from the right cheek shows a very few scattered, beaded, and apparently broken-up lepra bacilli but no clumps. Specimens taken from several other parts of the body are negative.

July 1: Appearances of face and ear are normal so far as leprosy is concerned, but there is considerable white-scar tissue scattered over this area. No part of the body shows at present any signs of existing leprosy. Microscopical examination of skin scrapings from different parts of body, especially right side of face, nose, chin, etc., are all negative. The general physical condition of patient has gone down rapidly during the past six months and he is now suffering from general anasarca and from anaemia. Also has albumen in urine.

July 11: Patient died to-day. Cause of death, general debility, following atrophy of liver, anæmia and general anasarca. Autopsy held by Dr. Maximilian Herzog, pathologist of the government laboratories, the summary of whose autopsy report, with his full microscopical report, follows:

"Domingo Panol, male, Filipino, 37 years of age. Autopsy held three hours after death shows:

"Fatty degeneration of myocardium and kidneys, with interstitial nephritis, advanced atrophic cirrhosis of liver, purulent abscess in the anterior abdominal wall just above Poupart's ligament, anæmia and œdema of brain, general anasarca and general profound anæmia. The serous cavities and soft tissues all contained serous fluid in considerable amounts. Old pale cicatrices of the right side of face; the integument in many places is somewhat scaly, but nowhere are there seen formations such as we find in tubercular leprosy.

"*Microscopical examinations.*—Tissues were taken for microscopical examinations from the following places and organs: Two pieces from the left side of face from the area which appeared somewhat depressed, pale and cicatricial in character; from the ear which formerly had presented a nodular tubercular appearance; from the kidneys, spleen, liver, heart, and from several peripheral nerves. These tissues were fixed in Zenker's fluid, subsequently embedded in paraffin, sectioned, and stained with hæmatoxylin eosin and with Ziehl's carbolic-fuchsin and methylene-blue.

"In the sections from the skin and those from the ear, which latter took in all of the tissues of the concha, the subcutaneous layers, showed patches of a subacute loose inflammatory infiltration composed of lymphoid cells. In these areas, however, neither epithelioid or giant cells are found. Likewise lepra bacilli could not be demonstrated. The liver presented the histologic picture of a well-advanced cirrhosis. The increased interacinous-connective tissue is mostly of a fusiform variety,

with a few small, round lymphoid cells here and there. Lepra bacilli are not demonstrated in the hepatic sections. An examination of the renal, splenic, cardiac, and nerve sections likewise fails to show lepra bacilli.

"In other words, neither the histologic nor the bacteriologic examination of this case furnished any evidence at all that the patient at the time of his death was suffering from leprosy, either cutaneous or internal.

"HERZOG."

CASE No. 12.—Arsenio Miranda; male; Filipino; age, 19 years; admitted December 12, 1904; clinical diagnosis, hypertrophic leprosy; duration of disease said to be about two years.

On admission patient appears well nourished and in good general health. Has numerous dark reddish, elevated, leprotic patches on face, arms, legs, and more especially on back. The individual patches appear congested and puffed out and seem to be about one-eighth inch higher than the surrounding skin. The fingers of both hands are drawn to a half-shut position, and there is slight contraction of the muscles of legs, so that his walking is impaired.

December 14: Microscopical examination of skin scrapings from cheek shows lepra bacilli present.

January 9, 1905: X-ray treatment begun, applications being made to lesions on on right side of face at a distance of 8 inches for ten minutes.

January 12: X-ray applied on the 9th, 10th, 11th, and 12th. To-day a small blister is noted on cheek about center of point of exposure.

January 19: Blister on cheek gradually enlarged to size of thumb nail and then scabbed over. X-ray treatment has been transferred to a larger blotch on back, which is oval in shape, about 3½ by 2½ inches in size, abruptly elevated one-eighth of an inch above surrounding parts, and deep red in color. A portion of the spot treated on the face shows some fading of color and reduction of elevation. One spot on forehead not treated directly has been reduced from a very perceptible elevation.

January 31: This patient has been treated seven times up to date, viz, on January 9, 10, 11, 12, 19, 20, 21, and 23, and shows marked reduction of the cutaneous manifestations of leprosy not only at the points treated, but to just as great an extent on parts of the body most distant from the points of application.

July 1: There has been a wonderful improvement in all of the leprotic manifestations of this patient during the past five months, during which time he has had 17 applications of X-ray, making a total of 24 applications. All of the elevated dark-colored spots on the face and body have disappeared and are replaced by slightly depressed light-colored scar tissue spots, which appear slightly striated and drawn, as if by newly formed connective tissue. The deformity of the fingers has disappeared from all except the little fingers, and has markedly decreased in them. The defect of the muscles of legs has entirely disappeared, and the patient walks naturally.

July 21: Three microscopic examinations made, one from cheek and two from back; all found negative.

July 25: Three microscopic examinations made, one from face, one from scraping of mucous membrane of nose, and one from back; all found negative.

July 27: Microscopic examinations made of arms and cheek; all negative.

August 3: Three microscopic examinations made; all negative. Case considered cured.

August 8: Four microscopic slides made by Dr. M. Herzog and examined at government laboratories; all found negative.

August 16: Three slides made to-day and three made August 14 have all been negative.

September 30: This case remains apparantly well, and frequent microscopic slides made recently have all proven negative for lepra bacilli.

CASE No. 13.—Benedicto Mendoza, male, Filipino, age 25 years. Admitted February 21, 1905. Duration of disease, about two years. Clinical diagnosis, atrophic and hypertrophic leprosy.

On admission patient appears to be in fairly good general health and is a little above the average in intelligence. He has a slightly elevated dark leprotic patch on upper lip, covering region of mustache and extending slightly beyond; a patch the size of a silver 25-cent piece about the center of left cheek, and one the same size on anterior surface of right elbow. The posterior surface of right elbow shows some anæsthesia and the skin is glossy. There is beginning atrophy of the right little finger nail, and this finger is contracted to an angle of about 30°; the next finger is bent to an angle of 15°, and this entire area shows slight anæsthesia. A microscopic examination of skin scrapings from the patch on upper lip shows lepra bacilli.

May 8, 1905: X-ray treatment begun on upper lip.

July 1: X-ray treatment has been given fourteen times—May 8, 9, 12, 13, 17, 19, 22, 24, 26, 29, 31, and on June 2, 5, and 9. He now appears practically well, only a slight discoloration remaining on upper lip. Lepra bacilli can not be found there.

August 1: It is now impossible to definitely outline the patch which formerly existed on the upper lip; not only has the infiltration entirely disappeared, but the discoloration has practically all been absorbed. It is difficult to locate the spot that formerly existed on the cheek, and the other manifestations have likewise decreased. On several occasions I have been unable to find lepra bacilli, and on account of the entire disappearance of deposits I have included this case among the cases cured, although I am continuing treatment and am not satisfied of the permanency of the cure for two reasons: First, because the disappearance of symptoms has been too recent, and, second, because in one of a number of slides taken August 3 from this case I found several doubtful acid-fast objects, which appeared to be broken up and degenerated lepra bacilli.

Slides taken on August 11 and 16 have all been negative.

GENERAL REMARKS.

As may be seen from the above, there is absolutely no doubt that at least one case (No. 5) of genuine leprosy has been cured by the application of X-rays. This case I have given in considerable detail, with every practicable form of confirmatory evidence, in order to establish the fact as a basis for future work along this line. As may be noted, this case was clinically diagnosed not only by myself, but by numerous other physicians. The diagnosis was twice confirmed by microscopic examinations made at the government laboratories, and on three successive occasions confirmed by myself microscopically. The treatment and gradual improvement was watched by quite a number of physicians in Manila. Then we have the cure represented in a photograph and also confirmed by myself, several times microscopically, and finally confirmed both macroscopically and microscopically at the autopsy by the government laboratories. The only part of the record with which I am not satisfied is the photographic, as I would like to have had a photograph showing his condition on admission. The other two cases reported as cured are now in apparent good physical condition, and I hope that their future history may demonstrate the permanency of the cure.

HOW DOES THE X-RAY TREATMENT OPERATE?

I am inclined to believe that where a local lesion of leprosy is treated with X-ray the organisms there localized are killed and their bodies absorbed by the system, thereby producing an immunity against the living organisms. This, as may be seen, would be practically analogous with the immunization of individuals against bubonic plague by injecting into them killed cultures of plague organisms. In our case we simply grow the culture of lepra bacilla in the human body as a culture medium and then kill them by use of the X-rays.

In support of this theory I cite the following facts:

First.—The treatment of one leprous spot on a patient produces improvement in spots at a distance from the one actually treated.

Second.—The cure in the distant spots seems to progress parallel and to be just as complete as in the one treated.

Third.—The best results seem to be obtained only when treatment is pushed to the point of killing or beginning to kill the tissues, which would also probably be to the point of killing the organisms.

Fourth.—Cases in which there are massive localized leprous deposits, as in case No. 5, are most rapidly improved. As in these cases, we have an abundant culture on which to operate, and thereby produce immunity more rapidly.

Fifth.—In diffuse general involvement of slight degree or atrophic character, where there are only a few scattered organisms, we have had little success.

Sixth.—In two well-advanced cases, where the amount of new leprotic tissue was excessively great, the improvement was marked and rapid, but followed by loss of general health and rapid physical decline. This may be an overdosage, so to speak.

LIMITATIONS AND DIFFICULTIES ENCOUNTERED IN THE USE OF THE X-RAY MACHINE.

Being so far away from the source of supplies, we have had much trouble in keeping a satisfactory supply of tubes and in having repairs made to our X-ray machine. I have not as yet been able to find anyone about Manila that really understands all

of the parts of an X-ray machine, so that defects could be located and repaired without delay. The repair work has fallen mostly on myself, and while I am able to take the machine apart and frequently successfully repair it, still it is oftentimes a process of try and see and often try again. The tubes frequently burn out or wear out, their internal resistance becoming too high, and not infrequently the sparking power of the machine falls from 10 inches to even 3 or 4 inches, thus rendering it useless. One time the batteries are at fault, next and most frequently the interrupter is at fault, then the Leyden apparatus is blamed, and finally the internal resistance of the tubes becomes too great. So I must admit that to use an X-ray machine from twenty minutes to one hour a day over a period of several months and get active effective results from it is not an easy matter.

In conclusion, I wish to express my gratitude to Maj. E. C. Carter, U. S. Army, our former commissioner of public health, for the interest which he took in procuring the necessary apparatus and for the encouragement which he gave me during the progress of this work.

H. BROOKMAN WILKINSON,
Physician in Charge of San Lázaro Hospitals.

SAN LÁZARO HOSPITALS,
Manila, P. I.

REPORT OF THE PHYSICIAN IN CHARGE OF SAMPALOC HOSPITAL.

MANILA, P. I., *September 1, 1905.*

SIR: I have the honor to render the following report of work done at this hospital and in the women's department of San Lázaro hospitals during the period commencing September 1, 1904, and ending August 31, 1905:

The women's department of San Lázaro hospitals continued practically without change from the date of last report, September 1, until December 1, 1904. In November, 1904, the urgent need for some adequate provision for the indigent insane led to the establishment of an insane department in lieu of the women's department in San Lázaro hospitals and the removal of the latter department to its present quarters.

This change was accomplished between December 1 and 10, 1904, the Sampaloc Hospital being in full operation on the latter date. Dr. George D. Fairbanks was in charge at this time and during December.

The Sampaloc Hospital occupies the resident portion of the building situated at No. 4 Calle Alejandro VI. It consists of a basement, comprising offices, steward's room, drug and store room, laundry, driveway, and small garden; a second floor, comprising wards, hallway, dining rooms, kitchen, nurse's room, operating room, and bathrooms, and is equipped for the accommodation of 70 patients.

The personnel of the hospital consists of an attending physician, house physician, steward, trained nurse, matron, 3 native nurses, assistant cook, 6 muchachos, and 2 laundresses.

The wards and dining rooms are so arranged that each nationality has its own, so far as possible, and since the establishment of the hospital there has been no friction of any kind, all seeming well satisfied with their treatment.

The methods pursued have been, in general, the same as last year, efforts toward improvement being made wherever possible.

An attempt has been made to divide the responsibility and work of the hospital so that the best results possible would be accomplished. The dispensing of medicines is done by the house physician under the supervision of the attending physician. The trained nurse has charge of the operating room, and is responsible for its management. The matron has charge of the wards, hallways, etc., assisting the steward in the general management of the hospital. The clerical work is divided between the steward and attending physician.

The possession of a new card-filing section makes it possible to keep the history cards securely, and at the same time when cards are sorted and completely indexed any card can be turned to for reference almost instantly.

The work accomplished during the entire time covered by this report may be stated as follows:

	Patients.
Remaining September 1, 1904	106
Admitted	814
Discharged or transferred	874
Died	0
Remaining September 1, 1905	28

The average number treated per day for the total period was 63. It was 81 in September, 75 in October, 60 in November, 38 in December, 55 in January, 60 in February, 72 in March, 72 in April, 62 in May, 51 in June, 53 in July, and 53 in August.

The average cost of subsistence per patient per day was, during September, ₱0.36; in October, ₱0.35; in November, ₱0.40; in December, ₱0.38; in January, ₱0.26; in February, ₱0.23; in March, ₱0.27; in April, ₱0.30; in May, ₱0.30; in June, ₱0.35; in July, ₱0.34; in August, ₱0.34.

During September 2 patients were given into the custody of the police for misconduct, uncured, and 1 was transferred to San Juan de Dios Hospital, complication, malarial fever. During October 10 patients were turned over to the police, uncured, for misconduct. During November 1 patient was turned over to the police and 1 was transferred to the contagious-disease hospital with measles. December was uneventful. In January 1 was turned over to the police, uncured, and 2 were sent to the San Juan de Dios Hospital. The diagnosis of the latter were hepatitis, subacute; gastritis, acute, and stomatitis; and endometritis. In February 1 case was transferred to San Juan de Dios Hospital with acute peritonitis. In March there were no transfers. In April 1 case was turned over to the police, uncured, and 2 were transferred to San Juan de Dios Hospital—diagnosis, hepatitis, acute, and constipation, and diarrhea, acute. In May 1 was transferred to San Juan de Dios Hospital—diagnosis, pelvic peritonitis—and 1 was discharged, uncured, to leave the islands. During June and July there were no transfers. In August 2 cases were transferred to San Juan de Dios Hospital—diagnosis, fever, undetermined, and hemorrhoids, respectively.

Very respectfully,

EDWIN C. SHATTUCK,
Physician in Charge.

THE COMMISSIONER OF PUBLIC HEALTH,
Manila, P. I.

REPORT OF THE VETERINARY DIVISION.

MANILA, P. I., *September 9, 1905.*

SIR: I have the honor to submit for your information a report of the veterinary corps during the period from September 1, 1904, to August 31, 1905.

The records of this office show that 12,708 animals have been inoculated against rinderpest by the serum method and 935 by the simultaneous method.

Rinderpest has been reported from 19 provinces, covering 59 municipalities.

Owing to a short supply of serum throughout the year, inoculations were only made among herds where rinderpest was present.

By the serum method we have been able to stamp out epizootics in every locality where inoculations were made, but it has been difficult to keep any one place permanently free from the disease on account of not having serum enough to inoculate animals of the entire locality.

There has been also a constant traffic in live stock throughout the islands during the past year, many animals being taken from an infected district to a noninfected district, while nonimmune animals have been taken into infected regions, thus disseminating the infection throughout the provinces. This condition will remain so long as no restrictions are placed on the moving of animals from infected districts to noninfected districts.

As there are weekly importations of live cattle from Hongkong, Singapore, and Saigon, all infected ports, it can be seen that rinderpest is continually coming into the islands and the infection being distributed throughout the provinces by the shipment of imported cattle from Manila. This can be remedied by prohibiting the importation of live cattle from infected countries or by establishing quarantine stations at all ports of entry in the archipelago and requiring that all animals be rendered immune before leaving said stations, and along with this measure a law should be enacted making it obligatory that all nonimmune animals susceptible to rinderpest be inoculated by the simultaneous method. While there is danger of a loss of from 1 to 10 per cent by this method, such a small loss is no comparison to the loss from the ravages of the disease. Even if the mortality reaches 25 per cent from the inoculations, it would be economy to inoculate every animal in the islands.

Instructions were issued from this office August 14 of this year to all inoculating parties in the provinces to discontinue the serum method and use only the simultaneous method in the future. Many obstacles are encountered when this method is employed in the way of prejudices of the natives against virulent blood being used for inoculating. Many large cattle owners prefer to take chances with the disease, notwithstanding their experiences in 1901 and 1902, when more than 95 per cent of

attacked animals succumbed. For this reason it is urgently recommended that an obligatory law be enacted by the Philippine Commission, as referred to above.

Four thousand three hundred and fifty animals have been examined in the city of Manila for surra; 195 of these were found positive and condemned. Surra has been reported from 7 provinces, as well as in the city of Manila. The majority of cases have been sporadic among horses, while carabaos are found to be infected in large numbers in Bulacán and Laguna provinces. There is no means known at present whereby surra can be eradicated except by segregation of all exposed animals and the destruction of infected ones and a thorough disinfection of corrals.

Seventy-seven thousand six hundred and fifty-two animals have been inspected for slaughter at the public abattoir in Manila. One American veterinarian and a native inspector are detailed for this work. One hundred and thirty-six carcasses have been condemned on inspection and cremated.

One thousand one hundred and twenty-seven carabaos and cattle were examined for shipment to the provinces. These examinations were made at the request of owners, as cattle are more rapidly disposed of in the provinces when accompanied by a certificate of health.

Seventy-one horses have been condemned and cremated for glanders in the city of Manila. This disease has been held in check during the year in Manila, but in the provinces, where practically no sanitary precautions against glanders are carried out, the disease is present in every barrio in the archipelago. This disease is one of the most important affecting the equine race, but owing to the fact that carabaos in this country are the principal beasts of burden our work has been given over almost exclusively to the controlling of rinderpest.

Foot-and-mouth disease has been reported from nearly every province, as well as in Manila. As this disease is readily amenable to treatment, instructions have been given owners, and the disease has caused but little trouble except where the animals were working when receiving treatment.

Hog cholera and swine plague are always present in this country, the two diseases killing probably 70,000 hogs annually. The average (killing) hog is worth about ₱42 on the market in Manila, making the total loss to the swine industry the enormous sum of ₱2,940,000.

Chicken cholera is prevalent in most of the provinces, and according to reports from the provincial health authorities the mortality reaches above 100,000 annually, causing an approximate loss of ₱60,000 to the people from this source alone.

Chicken cholera and hog cholera can be controlled by proper sanitary measures.

Epizootic lymphangitis, a disease somewhat resembling cutaneous glanders, is widely distributed over the islands and occasions severe loss to horse owners, owing to the fact that the animals are incapacitated for work for long periods of time. This disease is amenable to treatment, but is of long duration. The mortality is about 5 per cent.

The organism of Texas fever, an infectious disease of cattle, is always present through the medium of the cattle tick, *Boophilus australis*, which is a source of danger to all cattle imported into the islands from noninfected countries. It is believed by the veterinarians of the Far East that all, or nearly all, of the cattle of the Philippines, China, Straits Settlements, and part of Australia are immune to this disease. The mortality is about 60 per cent.

Dermatitis gangrenosa is another contagious disease affecting horses and which has been a source of trouble to American horses in this country. It has been present at intervals in the insular purchasing agent's corral for the past three years. The mortality from this disease is very low when proper treatment is applied early, but if left to itself the mortality may reach as high as 15 or 20 per cent.

Hemorrhagic septicemia, a disease affecting all domestic animals, has been reported in Occidental Negros and in the city of Manila. This disease has a mortality of about 90 per cent, but is not readily contagious and can be controlled by proper sanitary measures.

Anthrax was reported by Dr. R. H. McMullen, formerly of this department, to be prevalent in the province of Benguet, and from the history obtained from the natives of that section the disease has existed there for several years, occurring at the beginning of the rainy season each year and apparently dying out with the coming of the dry season. This disease is the most deadly of any which affect the domestic animals and is communicable to man.

Provision was made for 15 veterinarians for the veterinary division, which number has never been filled at any one time, owing to the difficulty of inducing suitable men to come here from the United States, and at the present time the demand in the home land for veterinarians far exceeds the supply. Three veterinarians have resigned during the past year, and 2 were transferred to other bureaus. Six veterinarians

have been admitted to the corps, 5 having been sent from the United States and 1 appointed in Manila. The present force comprises 11 veterinarians, including the chief veterinarian, who is in the United States on leave of absence.

The number of inoculators for the division was placed at 20 Americans and 10 Filipinos. The present force consists of 15 Americans and 3 Filipinos. There are also 3 natives employed as assistant meat inspectors, 1 being detailed for duty at the public slaughterhouse and the other 2 being detailed to inspect animals entering the port of Manila by way of the river and railroad.

Thirteen thousand nine hundred and seventeen dollars and eight cents Philippine currency was collected during the year from veterinary collections for port inspections.

The accompanying charts will show in detail the work done by this division.

Very respectfully,

DAVID G. MOBERLY,
Acting Chief Veterinarian.

The COMMISSIONER OF PUBLIC HEALTH,
Manila, P. I.

Serum treatment given animals in provinces from September 1, 1904, to August 31, 1905.

Province.	Carabaos.	Cattle.	Province.	Carabaos.	Cattle.
Negros Occidental	2,013	138	Ambos Camarines	1,651	125
Surigao	11		Bohol	354	
Pampanga	3,106	106	Misamis	313	105
Abra	307	91	Ilotlo	19	2
Rizal	1	2	Mindoro	120	
La Unión	600	56	Ilocos Norte	1,978	12
Leyte	596	4	Capitan	250	2
Cagayán	39	148			
Cavite	915	190	Total	11,460	988
Albay	187				

Grand total, 12,448.
Rinderpest was prevalent in every herd where serum was employed.

Inspections of animals in provinces.

Province.	Months.	Surra.				Cholera.		Foot and mouth.			Glanders.	
				Positive.			Positive.					
		Horses.	Carabaos.	Horses.	Carabaos.	Hogs.	Hogs.	Carabaos.	Cattle.	Positive.	Horses.	Positive.
Bulacán	November	234	702	9	20						1	1
Occidental Negros	March					25	25					
Albay	June	23		23								
Rizal	July							14	2	16	26	2
Occidental Negros	do										86	27
Benguet	August							134		134		
Total		257	702	32	20	25	25	148	2	150	61	30

Microscopical examinations for surra.

Month.	Slides examined.				Negative.			Positive.				Condemned for surra		
	Cattle.	Carabaos.	Horses.	Total.	Cattle.	Carabaos.	Horses.	Cattle.	Carabaos.	Horses.	Total.	Cattle.	Carabaos.	Horses.
1904.														
September		77	766	843		74	747		3	19	843			15
October	25	27	798	850	25	27	790			8	850			9
November		32	572	604		30	566		2	6	604			6
December		2	1,081	1,083		2	1,028			53	1,083			54
1905.														
January	12	238	72	317	12	209	70		24	2	317			2
February	9	72	75	156	9	67	75		5		156			1
March	4	42	288	334	4	34	287		8	1	334			
April			12	12			2			10	12			10
May			29	29			24			5	29			5
June			4	4			2			2	4			2
July			2	2						2	2			2
August			116	116			115			1	116			1
Total	50	485	3,815	4,350	50	443	3,706		42	109	4,350			108

Inspections.

Month.	Inspections.		Condemned on inspections.			
	For shipment to provinces.		Horses.		Other animals.	Total.
	Cattle.	Horses.	For glanders.	For surra.		
1904.						
September	288		2	15	7	24
October	98		9	9	4	22
November	60		13	6	7	26
December	40		9	54	8	71
1905.						
January	100		9	2	30	41
February	100		4	1	3	8
March	32				1	1
April	69		5	10	2	17
May	137		11	5	8	24
June	122	1	5	2	16	23
July	22	1	2	3		5
August	62		2	1	1	4
Total	1,125	2	71	108	87	266

Inspections on arrival in city.

Month.	Number of inspections.	Cattle.	Carabaos.	Horses.	Hogs.	Sheep.	Goats.	Animals.	Total.	Pesos.
1904.										
September	536	4,178	371	157	4,541	7	73	11	9,338	1,416.70
October	620	2,841	360	131	4,626	10	65	29	8,062	1,193.40
November	551	2,422	63	108	4,271	16	48	6	6,934	1,059.90
December	534	3,089	54	193	4,244	16	38	38	7,664	1,183.00
1905.										
January	313	2,496	229	136	4,268	10	64	18	7,223	1,078.00
February	437	2,137	42	153	4,166	4	39	9	6,550	1,025.60
March	604	2,274	57	248	4,832	26	90	12	7,539	1,216.80
April	588	1,896	42	182	4,724	11	56	10	6,923	1,067.90
May	583	2,546	68	647	4,628	18	88	16	8,011	1,189.50
June	615	2,577	95	143	4,136	5	53	21	7,030	1,115.60
July	653	2,516	118	171	4,143	8	43	12	7,011	1,129.70
August	634	3,194	128	607	3,991	10	51	9	7,990	1,241.70
Total	6,670	32,168	1,607	2,876	52,570	141	720	191	90,275	13,917.80

Slaughtered in Matadero and condemned.

Month	Slaughtered.					Condemned.		
	Cattle.	Hogs.	Sheep.	Goats.	Total.	Cattle.	Hogs.	Total.
1904								
September	2,106	4,921		2	7,029	4	9	13
October	2,289	5,032			7,321	6	12	18
November	1,726	4,736	1		6,463	2	5	7
December	1,662	4,761	3		6,426	1	8	9
1905.								
January	1,728	4,718	1	1	6,446	2	8	10
February	1,431	4,658			5,989		10	10
March	1,486	4,894	2		6,382	2	9	11
April	1,259	4,883			6,142	3	13	16
May	1,469	5,060	1		6,530	1	9	10
June	1,442	4,688		1	6,131	2	13	15
July	1,756	4,710	3	2	6,471		6	6
August	1,760	4,613		3	6,322	4	7	11
Total	20,068	57,674	11	9	77,652	27	109	136

Government abattoir—cattle.

Months.	Heads.	Condemned.									
		Lungs	Livers	Feet	Legs.	Lips	Tongues	Stomachs	Ribs.	Ribs.	Total
1904											
September	1	201	486	20	4						716
October		79	530	17		23					655
November		93	436			17					548
December		188	436	4		3					631
1905.											
January		86	547								635
February	1	172	364		1						538
March		169	424	30	2			1			626
April		133	324	541		7					1,008
May	7	156	302	672		28	5		3	2	1,174
June		109	330	429		23	3				895
July		102	334	493		26					955
August		117	374	228	1	10					734
Total	9	1,605	4,887	2,434	8	135	8	1	3	2	9,119

Government abattoir.

Months.	Hogs.				Sheep and goats.				
	Condemned.			Total.	Sheep killed.	Goats killed	Total.	Sheep livers condemned.	Total.
	Lungs.	Livers.	Feet.						
1904.									
September	257	224	374	864		2	2		
October	226	215	343	796					
November	204	156	334	699	1		1		
December	206	167	396	777		3	3		
1905.									
January	104	161	413	686	1	1	2		
February	162	160	378	720					
March	192	101	547	849	2		2	1	1
April	299	136	486	934					
May	361	137	564	1,071	1		1	1	1
June	356	122	626	1,116		1	1		
July	342	116	597	1,050	3	2	5		
August	267	109	511	894		3	3		
Total	2,995	1,793	5,559	10,456	8	12	20	2	2

Inoculation of cattle and Carabaos against rinderpest by simultaneous method April 1, 1904, to June 30, 1905.

Pueblo.	Province.	Carabaos.	Cattle.	Date.	Veterinarian.	Deaths.	Remarks.
				1904			
Calumpit	Bulacán	412	.....	May 7	Glaisyer	19	
Goa	Ambos Camerines	80	.....	July 8	Smith	0	
Lagonoy	do	63	.....	July 18	do	0	
San Miguel	do	98	.....	July 7	do	0	
Tigaon	do	214	.....	July 3	do	0	
		867				29	
San Pascual	Burias	68	.....	Aug. 25	Moberly	0	See note.
Total		935	.....			29	

NOTE.—Government animals. These inoculations made as tests. No reaction.

APPENDIX B.

REPORT OF THE BOARD OF DENTAL EXAMINERS FOR THE PHILIPPINE ISLANDS.

DEPARTMENT OF THE INTERIOR,
BUREAU OF HEALTH FOR THE PHILIPPINE ISLANDS,
Manila, P. I., June 30, 1905.

SIR: We have the honor to submit the following report of the transactions of the board of dental examiners for the year ending June 30, 1905.

The members constituting the board July 1, 1904, were as follows: Dr. Robert T. Oliver, president; Dr. A. P. Preston, secretary-treasurer; Dr. A. Vergel de Dios, member.

At the present time the personnel of the board remains the same with one exception, Dr. Henry C. Strong, now occupying the former position of Dr. Robert T. Oliver, who tendered his resignation on leaving the islands.

As provided for by act No. 593, semiannual meetings were held July 5, 1904, and January 3, 1905, for the examination of candidates requesting registration for the practice of dentistry in the Philippines.

Other meetings of the board for the transaction of business were held at various times throughout the year as necessity demanded, as follows:

July 10 and 30, 1904: Continuation of the examination given candidates on July 5, 1904, and reports on same.

Action on request of Dr. H. C. Strong for temporary registration to practice dentistry until the next regular meeting to be held January 3, 1905: Granted.

December 21, 1904: Discussion relative to eligibility of Herr Fritz Oppen, of the University of Munchen, to appear before the board. It was decided to admit him for examination.

January 25 and 31, 1905: Continuation of examination of candidates held on January 3, 1905, at semiannual meeting.

February 5, 1905: Report on same.

March 16, 1905: Visit by the board to the office of Chu jee Sam, an unregistered Chinese dentist, at 192 San Jacinto, Manila, who had recently been fined for practicing illegally.

After inspection of his equipment and the gathering of data relating to his statement that he was in practice in Manila before the passage of act No. 593, it was decided to give him permission to practice until the next semiannual meeting of July 3, 1905. His affidavit to appear before the board for examination at that time was received.

May 16, 1905: The Secretary was directed to address a letter to an unregistered dentist, Doctor Cotton, in the office of Doctor Merchant, Escolta, Manila, requesting him to immediately cease practice. As Doctor Cotton did not intend to remain in the Philippines until the next semiannual meeting of the board on July 3, 1905, his affidavit could not be accepted.

On February 11, 1905, and acting under advice of the secretary-treasurer, Dr. A. P. Preston, that certain memberships of the board were about to become vacant, the following appointments were made and confirmed by the board of health for the Philippine Islands:

For the unexpired term of Dr. Robert T. Oliver (resigned), Dr. Henry C. Strong.

For membership on the board (term expired), Dr. A. Vergel de Dios (reappointed).

On March 10, 1905, notice was received from the collector of internal revenue for the Philippine Islands regarding the affixing of internal-revenue stamps on the certificates issued by this board, and the same will hereafter bear the necessary stamps, as required by the new revenue law (paragraph 6 (c) of section 116 of act. No. 1189).

At this time there is no knowledge before the board of any violation of act No. 593, and but one application is at hand for examination, that of Chu jee Sam, the Chinese dentist, who will appear before the board at the next semiannual meeting to be held July 3 and 5, 1905, account of which will appear in the next annual report.

During the year the following gentlemen received certificates permitting them to practice dentistry in the Philippine Islands:

Examination of July 5, 1904: Graduates, Hugo C. Rietz, D. D. S.; William A. Birch, D. D. S. Undergraduates, Eusebio Castro, Miguel Concepción, Nicolás Reyes y Carson.

Examination of January 3, 1905: Graduates, Frank Carll, D. M. D.; Henry C. Strong, D. D. S., M. D.; Fritz Oppen. Undergraduates, Apolonio Rosal Santos, Miguel Ochoa, Pedro Crisólogo y Villanueva.

The preceding summary of business transacted by the board of dental examiners shows that four graduates of reputable American schools conferring degrees recognized by the national association of dental faculties, and one graduate of the University of Munchen, Germany, were examined and registered during the past year. At this date no complaints or criticisms have reached the board regarding these gentlemen and all are believed to be practicing their profession satisfactorily and successfully in their respective communities.

During the year, in addition to the above, there were six gentlemen registered as undergraduates, all from the Santo Tomás University, Manila. These are located in various remote towns as required under section 5, of act No. 593, and are believed to be doing satisfactory work among their own people.

The cosmopolitan character of the population of the Philippines is well represented by the nationalities found on the register of the board. We believe that better service and greater satisfaction to the public will result as a consequence, professional ability being equal to the demands made upon it.

The American dental graduate predominates both in army and civil practice, and the number of American dentists at Manila has promise of augmentation when the navy institutes this much-needed extension of service. There is considerable business derived by the civilian dentist from army sources and there probably will be as much more from the navy after the new service is instituted, but it is not necessary to consider the reasons here.

It is true, however, that there is a most urgent call for the navy dentist, judging from the inferior services rendered by incompetent operators while one or more of Uncle Sam's warships spends a time in some far eastern port. The supremacy of American dentistry and the appreciation of it in the Far East, over the other methods, needs no exploitation by this board.

One of the handicaps of the Philippine civilian dentist is the difficulty experienced in obtaining dental materials. There being no stock carried by any firm in the islands, it is necessary for each practitioner to carry a goodly stock of supplies and estimate his wants for two or three months ahead. In many cases of threatened or actual shortage this results in a conservation or substitution of materials that produces inferior work. It may be said to the credit of the various members of the profession in the islands that they are willing to assist one another, and borrow and lend indiscriminately.

However, owing to agitation and correspondence by a member of the board we now have the promise of a Manila branch of a leading American dental supply house which will within a year, probably, carry a complete dental supply at a moderate advance over United States prices. There is no doubt that nearly all dental supplies now used here are of American manufacture.

In order to avoid customs duties, annoyance, and delay on gold plate and solders, and for convenience, it is customary in the Philippines to roll or beat out gold coins for sheet gold. The brownish coppery gold resulting is not entirely adapted to high class dental work, although of high enough carat. This practice is to be condemned, though the gold is better than 14 or 16 carat, gold, which carries too much alloy to be used in the mouth. It is doubtful, even when the market is supplied with suitable sheet gold, whether it will be used by those who were not taught to do so.

In civil practice here the public does not need more dentists, but better ones; it needs those who will uphold the highest standards of excellence; it needs those whose equipment and training will justify the assurance of the attainment of the best grades of dental work. We need those whose habits are correct and whose offices and instruments are cleanly to that degree which is a guaranty against infection. We need gentlemen of professional honor who will uphold the principles governing this board and whose past history will bear inspection. There is not to-day a dentist in

the Philippines, of any nationality, whose finances are so low that a fee should be an inducement for him to mutilate a good tooth at the request of its misguided owner in order to display gold. Yet with standards that are low; with lack of competent instruction and training and teachers; with lack of suitable materials and untaught methods and processes, clumsy and dangerous procedures prevail at the hands of the careless and half-trained operators who are abroad in the land to do business with a public that frequently prefers to prescribe the kind of work to be done.

Those who desire the services of the first quality have little trouble to find a competent operator. Those who are not particular and do not specially value their future comfort have no difficulty in finding some one to do their bidding.

We desire to indorse the provisions of Act No. 593 and believe it to be satisfactory and fair in its application to present conditions in the Philippines.

We do not favor an annual registration fee or any tampering with the present act which governs our board. Should the prescribed fees at any time be insufficient to meet conditions we would favor a marked increase of the registration fees, which at present are considered too low.

Respectfully submitted.

A. P. PRESTON,
Secretary-Treasurer, Board of Dental Examiners.

The SECRETARY OF THE INTERIOR,
Manila, P. I.
(Through the Commissioner of Public Health.)

APPENDIX C.

REPORT OF THE BOARD OF PHARMACEUTICAL EXAMINERS FOR THE PHILIPPINE ISLANDS.

MANILA, P. I., *July 1, 1905.*

SIR: I have the honor to submit the following report of the work of the board of pharmaceutical examiners for the year ending June 30, 1905.

The board has held two examinations, the first on July 9, 1904, at which 16 applicants were present, and the second on January 3, 1905, at which 9 applicants presented themselves, making in all 27 applicants for the year; of this number only 9, or 33⅓ per cent, attained the required average and received certificates.

There have been issued during the year 108 apprentice's certificates, 11 temporary certificates, 1 practicante's certificate, and 1 pharmacist's certificate without examination.

There has been collected during the year	₱934.00
Refunded (certificate not issued)	20.00
Total	914.00
Treasurer's receipts on hand	908.00
Balance on hand	6.00

The following are the salary and fees paid or to be paid for this board from the board of health funds:

Salary of secretary-treasurer	₱300.00
Fees for two members at ₱4 each for 27 applicants examined	216.00
Total	516.00

The board of pharmaceutical examiners is composed of Enrique Pérez, president, Manuel Zamora, member; A. A. B. Schmerker, secretary-treasurer.

Very respectfully,

A. A. B. SCHMERKER,
Secretary-Treasurer, Board of Pharmaceutical Examiners.

Approved.

ENRIQUE PÉREZ,
President.
M. ZAMORA,
Member.

The SECRETARY OF THE INTERIOR,
Manila, P. I.
(Through the Commissioner of Public Health.)

Respectfully forwarded.

VICTOR G. HEISER,
P. A. Surg., U. S. P. H. & M. H. Service,
Commissioner of Public Health.

APPENDIX D.

ANNUAL REPORT OF BOARD OF MEDICAL EXAMINERS.

DEPARTMENT OF THE INTERIOR,
OFFICE OF THE BOARD OF MEDICAL EXAMINERS,
Manila, P. I., June 30, 1905.

SIR: Pursuant to section 4 of Act No. 310, regulating the practice of medicine and surgery in the Philippine Islands, I have the honor to submit the following report of the board of medical examiners for the year ending June 30, 1905:

The board of medical examiners was organized January 4, 1902, under the provisions of the medical law passed December 4, 1901, and began at once the work of registering the physicians, practicantes, and midwives of the islands. Since the organization of the board there have been registered 121 doctors of medicine, 294 licentiates of medicine, 153 cirujanos ministrantes or practicantes, and 31 midwives, representing 75 medical colleges or other medical examining bodies legally authorized to grant medical degrees. Classified racially there have been registered: Filipinos, 456; Americans, 106; Spaniards, 27; Japanese, 6; English, 2; Germans, 1; Chinese, 1. Classified by sex there are registered as physicians, 413 males and 2 females; as cirujanos ministrantes, 153 males; as midwives, 31 females.

The law requires that the board of medical examiners shall meet in the city of Manila on the second Tuesdays of January, April, July, and October of each year, for the purpose of examining candidates desiring to practice medicine in the Philippine Islands. In addition to examinations on the dates fixed by law, examinations have also been held at such times as the convenience of the candidates required.

Four forms of certificates of registration are issued to persons who have been examined and favorably passed upon by the board—one for persons holding the degree of doctor of medicine, another for persons holding the degree of licentiate of medicine, a third for undergraduates in medicine or cirujanos ministrantes, and a fourth for midwives.

Every person wishing to enter upon the practice of medicine and surgery in the Philippine Islands is required to present a diploma from a medical school or college recognized as reputable by the insular board of health, and, in addition, to submit to an examination in anatomy, physiology, chemistry, materia medica and therapeutics, pathology and bacteriology, hygiene, surgery, practice of medicine, obstetrics, diseases of women and children, diseases of the nervous system, diseases of the eye and ear, and medical jurisprudence.

The passing mark, in conformity with the requirements of the Federal Civil Service and of the Philippine Civil Service, has been placed at 70 per cent. The character of the tests may be judged from the following questions, which were used by the board during the year:

[Paper No. 1.]

ANATOMY AND PHYSIOLOGY.

1. (*a*) Describe the second part of the lingual artery, (*b*) show by diagram the circle of Willis.
2. Describe the subclavian triangle.
3. Name the branches of the popliteal artery and describe one of them.
4. Describe the cavernous sinus and its relations.
5. Describe the floor of the fourth ventricle.
6. Discuss the digestion, absorption, storage, and utilization of fats.
7. Discuss the factors influencing intestinal putrefaction, the nature and physiological action of the products formed, their fate in the body, the methods for their detection and estimation.
8. Discuss the acts of swallowing and vomiting, the peristalsis of the œsophagus, and the general physiology of nonstriated muscle.
9. Describe the changes in pressure in the four cavities of the heart and the movements of the valves during a cardiac cycle.
10. Describe the functions of the middle ear and their performance.

[Paper No. 2.]

SURGERY AND SURGICAL PATHOLOGY.

1. Describe the proper surgical treatment of a depressed fracture of the skull with laceration of the scalp.
2. Describe the operation of end-to-end intestinal anastomosis by means of the Murphy button.
3. Describe the operation of intubation of the larynx.
4. Give the characteristic symptoms and treatment of stone in the bladder.
5. What is the pathological significance of hemoptysis following injuries to the chest walls? State conditions that may cause it.
6. What is understood by primary, intermediary, secondary, and parenchymatous hemorrhage, respectively?
7. Enumerate the different methods at our disposal for controlling arterial hemorrhage and describe the process taking place after ligation of an artery.
8. Give a comprehensive definition of inflammation following an injury.
9. Pathological forms of Pott's disease. What bearing on formation of deformity?
10. Flat foot; etiology, pathology, treatment, mechanical and surgical.

[Paper No. 3.]

CHEMISTRY, MATERIA MEDICA, AND THERAPEUTICS.

1. State and illustrate the laws of definite and multiple proportions.
2. What amount of starch ($C_6 H_{10} O_5$) contains the same amount of oxygen as 100 grams of glucose? What is the volume of the oxygen?
3. Describe iodine in full; the physical characters of boric acid; the chemical characters of sulphuric acid.
4. Name five precipitants for albumin. Distinguish between albumen and globuline.
5. State the physical characters of glycogen and how you could detect its presence.
6. What is the physiological action of chloral? Write a prescription containing it.
7. What is the treatment of opium poisoning?
8. What is the physiological action of atropia? What are the doses of the preparations of belladonna in common use?
9. Describe the preparation of a fluid extract.
10. Describe the preparation of a tincture.

[Paper No. 4.]

BACTERIOLOGY, HYGIENE, AND LEGAL MEDICINE.

1. Name six different micro-organisms frequently found in suppurative inflammations, and give briefly the more important differential characteristics of each.
2. Define leiomyoma. Discuss the appearance, seats, structure, and nature of the growth, and name the common forms of degeneration occurring in it.
3. (a) Give the exact technique of obtaining and examining sputum for tubercle bacilli; (b) discuss the different methods of sterilizing employed in the laboratory, and the purpose for which each is applicable.
4. To what injurious effects upon health are school children most exposed; and how are they respectively produced?
5. Define disinfection. Mention five disinfectants and describe their respective applications.
6. Discuss the data from which one may estimate the time since death occurred.
7. Describe briefly some method of procedure in examining organic material for metallic poisons.
8. Describe the symptoms and post-mortem appearance in opium poisoning.
9. Define (a) minor surgery, (b) major surgery.

[Paper No. 5.]

GENERAL PATHOLOGY, THEORY AND PRACTICE OF MEDICINE: DISEASES OF THE EYE AND EAR.

1. Define thrombosis. Give the conditions favoring it, the method of formation of thrombi, the effects produced by them, and the subsequent changes occurring in them.
2. Amyloid degeneration. Definition, etiology, pathologic anatomy (giving both the gross and the microscopical appearances of some organ showing advanced amyloid degeneration) seats.
3. Discuss the phenomena occurring in an acute inflammatory process.

4. Give a description of stuttering and stammering, with special reference to their treatment.
5. In what ways are remedies applied for the local treatment of the skin.
6. Name four complications of acute otitis media and state the pathways of the spreading infection.
7. Treat an acute follicular tonsilitis.
8. Name the various diseased conditions producing hoarseness or aphonia.
9. Causes and treatment of recurrent epistaxis.
10. Differential diagnosis between acute iritis and acute glaucoma? Give treatment for each.

[Paper No. 6.]

OBSTETRICS, GYNECOLOGY AND DISEASES OF CHILDREN.

1. Describe the methods of measuring the pelvis. Describe the chief abnormalities of the bony pelvis, and how you would differentiate between them.
2. Describe the mechanism of labor in a case with the vertex presenting, and the occiput in the left anterior position.
3. Describe the method of conducting a normal labor, paying particular attention to the methods of obtaining and preserving aseptic conditions during the delivery.
4. Discuss the etiology and give the treatment of eclampsia.
5. Describe in detail the method of performing internal podalic version in a case of transverse presentation with the dorsum anterior and the head in the right fossa.
6. What is meant by presentation? Give the varieties. What is meant by position? Give the varieties.
7. What are the symptoms of retroflexion of the uterus? Give in detail the method of treatment.
8. Give the causes and treatment of enuresis.
9. Give symptoms indicating an excess of fat in the food of an infant.
10. Give the clinical manifestation of rickets in the order of their appearance during the first year of infancy.

The examination required of "cirujanos ministrantes," who are really no more than trained nurses, is much simpler, and is usually given orally. This class of candidates must present diplomas from the Santo Tomás University of Manila, showing that they have studied medicine for a period of not less than two years and have had conferred upon them the degree of "cirujano ministrante." The certificate issued by the board of medical examiners does not confer upon them the right to practice as physicians, but as cirujanos ministrantes. However, the medical act provides that any person who has studied medicine in the Santo Tomás University of the city of Manila for a period of not less than two years and has received the degree of cirujano ministrante from said university, may be registered to practice medicine in remote towns where no civilian doctor of medicine or licentiate of medicine is available, upon passing a satisfactory examination before the provincial board of health for the province in which he desires to practice and paying to its provincial treasurer a fee of $5 for a certificate of registration, which shall thereupon be issued to him by the president of the provincial board of health.

The course leading to the degree of cirujano ministrante extends over two school years, divided into four semesters, the studies for each of these divisions being as follows:

FIRST SEMESTER.

Elementary ideas of anatomy and physiology.

SECOND SEMESTER.

The rudiments of hygiene; general idea of first aid in injuries, burns, nervous attacks, intoxications, and asphyxia; diagnosis of real and apparent death.

THIRD SEMESTER.

Elementary ideas of therapeutics, especially hygienic therapeutics; disinfection; care of the sick.

FOURTH SEMESTER.

Dressings and bandages; operations of minor surgery; clinical work.

This course is entirely too elementary as a basis upon which to practice medicine. However, in view of the great scarcity of doctors in the provinces, it was thought best by the central legislative body to permit persons holding this degree to practice medicine under

the restrictions named. The time is not far distant when conditions will permit the elimination of the practicante with his superficial training and uncertain status, or at least his restriction to his proper sphere, that of nursing.

The number of physicians in the islands is increasing gradually, but in the provincial towns there is still a great scarcity, as may be seen from the following tables:

Total population of the Philippine Islands	7,635,426
Total number of physicians	415
Total number of practicantes	153
Total number of midwives	31
Ratio of physicians to population	1 to 18,399
City of Manila	
Population	219,928
Physicians	225
Ratio of physicians to population	1 to 977
All provinces, including all cities except Manila.	
Population, excluding Manila	7,415,498
Physicians	148
Ratio of physicians to population	1 to 50,445
Land area of the Philippine Islands, square miles	115,000
Average population to the square mile	67
Average number of physicians, excluding Manila, square miles	1 to 432

Carrying this classification further, and taking the subject up by provinces, we have the following table:

Province	Population.	Physicians.	Ratio of physicians to population.
Abra	51,880	1	1 to 51,880
Albay	240,336	4	1 to 60,084
Ambos Camarines	239,405	2	1 to 119,702
Antique	134,166	2	1 to 67,083
Basilan	30,179	.....	.....
Bataán	46,787	3	1 to 15,596
Batangas	257,715	6	1 to 42,952
Benguet	22,745	1	1 to 22,745
Bohol	269,223	1	1 to 269,223
Bulacán	223,742	12	1 to 18,645
Cagayán	156,239	4	1 to 39,060
Cápiz	230,721	6	1 to 38,453
Cavite	134,779	6	1 to 22,463
Cebú	653,727	6	1 to 108,954
Cotabato	125,875	.....	.....
Dapitan	23,577	.....	.....
Dávao	65,496	.....	.....
Ilocos Norte	178,995	4	1 to 44,748
Ilocos Sur	187,441	3	1 to 62,705
Iloilo	410,315	23	1 to 17,839
Isabela	76,431	1	1 to 76,431
Joló	51,389	.....	.....
La Laguna	148,606	7	1 to 21,229
La Unión	137,839	2	1 to 68,919
Lepanto-Bontoc	72,750	1	1 to 72,750
Leyte	388,922	3	1 to 129,640
Marinduque	51,674	1	1 to 51,674
Masbate	43,675	1	1 to 43,675
Mindoro	30,562	.....	.....
Misamis	175,683	.....	.....
Negros Occidental	308,272	8	1 to 38,534
Negros Oriental	210,494	2	1 to 105,247
Nueva Ecija	134,147	3	1 to 44,382
Nueva Vizcaya	62,541	.....	.....
Pampanga	223,754	10	1 to 22,175
Pangasinán	397,902	3	1 to 132,634
Paragua	20,351	.....	.....
Paragua Sur	6,345	1	1 to 6,345
Rizal	150,923	8	1 to 18,865
Romblón	52,848	1	1 to 52,848
Sámar	266,237	2	1 to 133,118
Siassi	24,562	.....	.....
Sorsogón	120,495	2	1 to 60,247
Surigao	115,112	1	1 to 115,112
Tárlac	135,107	3	1 to 45,035
Tawi-Tawi	14,638	.....	.....
Tayabas	158,065	4	1 to 39,516
Zambales	104,549	1	1 to 104,549
Zamboanga	44,322	1	1 to 44,322

It should not be inferred from these statements that there is a demand for American physicians in the Philippines, for such is not the case. What is needed is intelligent, faithful native physicians, who are content with small incomes, and are willing to devote their lives to the uplifting of their people.

The following extract from an article written by Dr. Louis H. Fales, a former medical inspector of the board of health and published in "The American Medicine," will give a very clear idea of the situation:

"The Philippine medical law requires that all who practice medicine in the islands must be graduates of reputable medical colleges and shall have passed a satisfactory examination before the medical examining board.

"Two years ago the conditions for private practice were much more favorable than they are at present, for during this time the American population in Manila has decreased from about 10,000 to a little over 4,000. This great migration from the islands has had a very depressing effect on all lines of business, and the practice of medicine has suffered in consequence.

"Although the last census returns (1903) gave the population of Manila as 219,941, a population which in America would support hundreds of physicians, the conditions are very different.

"The last census gave the division of population as follows:

Natives	189,782
Chinese	21,230
Americans	4,389
Spaniards	2,528
Europeans	1,117
All others	895
Total	219,941

"The great majority of the native population is yet ignorant on medical matters. They are practically fatalists, and do not appreciate the necessity of employing a physician, and many who do are too poor to pay for one. To substantiate this statement we find that more than one-half the natives who die in Manila have had no medical attention, the family calling in the municipal physician to sign the death certificate. Those of the native population who do employ a physician almost invariably call in the 'medico Filipino,' for he can understand their language, and they consider him as good, if not superior, to the American physician. It is well to say here that most of the Filipino doctors receive their education at the college of Santo Tomás in Manila. The Chinese, as well as the Filipinos, do not appreciate the value of medical attention by those of American or European education, or, in fact, any attention by a physician. Most of the practice among them is done by a Chinese doctor, a graduate of the medical college at Hongkong. It will be long before a paying practice can be established among them by legitimate methods. The Spanish people, as a rule, have their own Spanish doctors.

"For the American physician the American population should be the main source of his practice, but of the 4,398 Americans in Manila about 90 per cent are civil government officials and employees and their families, and are entitled to free medical treatment. It is true that some prefer to employ their own physician, but they constitute a small minority, and many who prefer other than civil medical attendant feel they are not able to afford the expense.

"Of the one thousand or more Europeans in Manila the majority are employed in firms or commercial houses. It is the custom of each of these houses to employ a physician, who, for a certain consideration per year agrees to attend all employees of the firm. This custom is so prevalent that there are very few Europeans who are not thus provided for."

It can readily be seen that, so far as Americans are concerned, the foregoing conditions make the field for medical practice in Manila at the present time very limited, and the same unfavorable conditions obtain even to a greater degree throughout the provinces.

FINANCIAL STATEMENT.

During the year the secretary-treasurer deposited in the insular treasury ₱1,560, Philippine currency, collected as shown in the following statement:

RECEIPTS.

	United States currency.	Philippine currency.
Examinations:		
7 doctors of medicine	$15.00	₱210.00
28 licentiates of medicine	15.00	840.00
14 cirujanos ministrantes	5.00	140.00
9 midwives	5.00	90.00
Total		1,280.00
Registrations:		
9 doctors of medicine	10.00	180.00
1 licentiate of medicine	10.00	20.00
7 cirujanos ministrantes	5.00	70.00
1 midwife	5.00	10.00
Total		280.00
Grand total		1,560.00

NOTE.—The foregoing statement does not include one doctor of medicine and one cirujanos ministrante who paid their registration fees in 1902, but whose names were omitted from the list by mistake.

DISBURSEMENTS.

[By the disbursing officer, board of health.]

Examination fees, Dr. Aristón Bautista.

	United States currency.	Philippine currency.
First half of year:		
4 doctors of medicine	$2.50	₱20.00
2 licentiates of medicine	2.50	10.00
6 cirujanos ministrantes	1.00	12.00
5 midwives	1.00	10.00
Second half of year:		
3 doctors of medicine	2.50	15.00
26 licentiates of medicine	2.50	130.00
5 cirujanos ministrantes	1.00	16.00
4 midwives	1.00	8.00
Total		221.00

Difference between receipts and disbursements, ₱1,339.

In the larger municipalities there have been comparatively few flagrant violations of the medical law, especially among Filipinos. The principal violators of the medical law have been Americans, generally hospitital corps men or exhospital corps men. In nearly all these cases it has been impracticable to secure sufficient evidence to warrant the arrest of the offenders.

In the smaller municipalities the "Mediquillos" have operated to some extent, but the harm that this class of quacks is able to do in comparison with that done by unprincipled Americans and Europeans is insignificant.

It will require time to regulate all these things: however, considerable progress has been made.

On the whole, the medical law has proved to be very satisfactory, and the conditions and the outlook are more favorable than at any time since American occupation.

Very respectfully.

R. E. L. NEWBERNE,
Secretary-Treasurer, Board of Medical Examiners.

The SECRETARY OF THE INTERIOR,
Manila, P. I.

(Through the Commissioner of Public Health.)

Respectfully forwarded.

VICTOR G. HEISER,
P. A. Surgeon, U. S. P. H. & M. H. Service,
Commissioner of Public Health.

APPENDIX E.

REPORT OF THE QUARANTINE SERVICE OF THE PHILIPPINE ISLANDS.

UNITED STATES TREASURY DEPARTMENT,
PUBLIC HEALTH AND MARINE-HOSPITAL SERVICE,
OFFICE OF THE CHIEF QUARANTINE OFFICER FOR THE PHILIPPINE ISLANDS,
Manila, P. I., September 12, 1905.

SIR: Pursuant to the instructions contained in the letter from your office of July 20, 1905, I have the honor to submit the following report of the transactions of the quarantine service of the Philippine Islands for the year ended August 31, 1905.

The year has shown a great improvement in the health situation of the islands. The number of vessels found infected upon arrival was only about one-half of that of last year. At the time the last annual report was being prepared the Philippines were threatened with an invasion of cholera, which was present at nearly all the Oriental ports with which the islands are in constant communication by vessels. The quarantine regulations with regard to cholera were enforced at the ports of departure, as well as at the ports of arrival in the Philippine Islands.

The great importance of the thorough and systematic inspection which is maintained by the United States Government at Chinese and Japanese ports of vessels which depart for the Philippine Islands can scarcely be overestimated.

Owing to the constant presence of quarantinable diseases in the nearby foreign countries, the responsibility which confronts the Service in preventing their introduction has not been diminished, and as the number of dangerous communicable diseases in the Philippines is constantly decreasing, it is more important than ever that no further infection be introduced. The successful accomplishment of this task will require the very best work of the Service and the increasing vigilance of its officers.

The Service has been administered during the period covered by this report much in the same manner as in previous years. One important departure, however, deserves special mention, viz, the aid rendered by the Army and Navy in carrying out quarantine regulations. At the ports of Jolo and Zamboanga the Army permits its medical officers to act as quarantine officers, and at Cavite the admiral commanding the Asiatic fleet has detailed a medical officer to act as quarantine officer at that port, with instructions to carry out the United States quarantine regulations under the direction of this office. With the aid of the foregoing services this office is in a much better position to make the quarantine regulations effective, and the assistance rendered is hereby gratefully acknowledged.

PERSONNEL.

Passed Asst. Surg. Victor G. Heiser, chief quarantine officer for the Philippine Islands.

Manila: Passed Asst. Surg. Victor G. Heiser, in command; Passed Asst. Surg. John D. Long; Asst. Surgs. R. H. Creel and Herbert M. Manning; Pharmacists N. C. Comfort and Charles R. McBride.

Mariveles: Passed Asst. Surg. Chas. W. Vogel.

Iloilo: Passed Asst. Surg. George W. McCoy.

Cebú: Passed Asst. Surg. Carroll Fox.

Zamboanga: Acting Asst. Surg. M. A. W. Shockley.

Jolo: Acting Asst. Surg. W. F. Lewis.

Cavite: Acting Asst. Surg. A. R. Alfred.

During the month of January the chief quarantine officer visited the principal ports of China and Japan for the purpose of conferring with the Service officers stationed at those ports with regard to immigration and quarantine matters which affect the Philippine Islands. The recommendations and the results thereof will be found discussed more in detail under the appropriate headings to which they pertain.

All stations of the Service were visited at least once during the year by the chief quarantine officer.

In accordance with the policy which has been in effect during the past two years, all commissioned officers have had an opportunity to avail themselves of the special details which have arisen from time to time, in order that they might be relieved from the monotony of the continuous boarding duty.

The Philippines assignment is probably the most trying that any quarantine officer is called upon to fill. .The quarantine season extends throughout the year, and the officers are required to be on active duty from sunrise to sunset. In addition, the proximity of countries in which quarantinable diseases are almost always present places the officers under a continuous tension, and they feel the responsibility very much.

The thanks of the Service are again due to the faithful and cheerful manner in which all of its officers and employees have performed their duties. The pharmacists and the remainder of the clerical force of the Manila office deserve special mention for the many hours of overtime work which they have performed.

VESSELS BOARDED.

There were 4,466 incoming vessels boarded at Manila and 5,050 at the other 6 ports of the islands, a total of 9,516. This is a decrease of 368 at Manila, and a decrease of 1,681 at the remaining ports, or a total difference of 2,049 in favor of last year. The actual number of vessels, however, that entered Philippine ports was probably greater than last year. For quarantine purposes a number of vessels were exempted from inspection, for instance: After October 25, 1904, the inspection was waived of all interisland vessels that carried an Army medical officer as part of the crew. During April, 1905, instructions were issued to exempt all interisland vessels from inspection which had not been absent from port over twenty-four hours, provided they came from noninfected ports.

VESSELS DISINFECTED.

There were 103 vessels disinfected. Of this number 98 were disinfected at the Manila station and the remainder at Iloílo and Cebú. In addition to the foregoing, there were 18 partial disinfections of vessels. Twenty-six were disinfected on account of quarantinable diseases being found on board upon arrival, and the remainder were disinfected on account of coming from infected ports, or because they had no bills of health, or at the request of the board of health, on account of being infected with rinderpest, or other cattle diseases. From the foregoing it will be seen that there has been a great decrease in the number of actually infected vessels. Last year there were 41, as against 26 for this year. This indicates that there has been a great improvement in the sanitary condition of the Philippines.

The advantage of having a fully equipped quarantine station was illustrated in the case of the United States battleship *Wisconsin*. Smallpox broke out on the vessel February 13, 1905. The usual measures that are at the command of a ship's medical officer for stamping out the disease were taken. Notwithstanding this, however, smallpox again broke out February 26. This office then offered the use of the Mariveles Quarantine Station, which was accepted by the admiral commanding the Asiatic fleet. The cases were removed and the suspects segregated. The crew was taken ashore, bathed, disinfected, and their effects disinfected with steam. The vessel was thoroughly disinfected. The entire personnel, including the officers, were placed in strict quarantine. No further cases occurred. When it is remembered that the crew consisted of 719 men, and that the quarters of a large battleship are necessarily cramped, the impracticability of successfully combating such a situation on board will be apparent. The foregoing case again confirms the past experience of the Service, viz: That even though there be all possible facilities for dealing with quarantinable diseases on board, yet they can not be successfully handled there, and the facilities of a modern quarantine station are necessary for stamping out the disease thoroughly and with a minimum danger to human life.

VESSELS FUMIGATED.

There were 277 vessels fumigated with sulphur for the purpose of killing rats and other vermin. This work requires a great amount of labor and patience. The fact that no claim has been presented for damages emphasizes forcibly the desirability of conducting this work under the direct supervision of trained officers. Ignorance or carelessness in one instance might occasion thousands of dollars' worth of damage.

On the whole, sulphur is probably the best agent that can be employed for this purpose, still it has many disadvantages. It is entirely unsuitable, for instance, for vessels that have tea in their cargo. If the faintest trace of sulphur should be imparted to the tea, it would depreciate greatly in value. In the search for a more suitable gas, cyanogen has been under

consideration, and a number of experiments were made. These, however, were discontinued on account of the great danger to human life. The crews of vessels in the Orient, with the exception of the officers, are generally composed of Chinese, Malays, Indians, or Filipinos, and the impracticability of conversing with these races, owing to the difference of languages, makes it impossible to explain to them the danger of inhaling the deadly cyanogen. The disagreeable odor of sulphur dioxide causes them to avoid it on that account alone. It is no uncommon experience to find, even after a vessel has been carefully searched and the sulphur ignited, that a member of the crew who has been asleep, perhaps in a dark place in the forecastle, will hastily make his appearance on deck. If the gas in such an instance had been obtained from cyanide, of potassium a fatality would have resulted.

CARGO.

The sanitary supervision of both incoming and outgoing cargo requires probably more time and attention than any other one branch of the work conducted by the Service in the islands. The Service officers stationed at the China and Japan ports have great difficulty in inspecting cargo destined for the Philippines. Orientals are very clever in their attempts to avoid the restrictions, and very persistent in attempting to ship cargo that is prohibited. It is not an uncommon experience to find that boxes manifested as dry goods, for instance, will in reality contain vegetables. The conference of the chief quarantine officer with the Service officers stationed in China and Japan resulted in a much better understanding of how this traffic could be best controlled, and at the same time not interfere unnecessarily with shipping. The important question of what vegetables might be safely admitted and the rules which should govern such shipments is now on a much more satisfactory basis than at any time since the Service took charge of the quarantine of the islands in 1900.

Some of the difficulties in the way of enforcing regulations to control the vegetable traffic between China and the Philippines will be seen from the following letter written by the insular collector of customs:

OFFICE OF THE COLLECTOR OF CUSTOMS FOR THE PHILIPPINE ISLANDS,
Manila, February 14, 1905.

SIR: After careful study of the efforts which have been made by this Bureau in the past two years to enforce the quarantine regulations of these islands, as prescribed from time to time by the chief quarantine officer, with regard to the importation of fresh garden produce from China and other countries, the undersigned has to state that it is a practicable impossibility to enforce said regulations with any degree of safety to these islands.

To illustrate, at the present time the importation of certain fresh garden produce, such as tomatoes, strawberries, celery, and lettuce, is absolutely prohibited when said articles originate in China, and the importation of certain other fresh vegetables from that country is dependent upon their having a certificate from the Marine-Hospital Service officer at their port of departure in China to the effect that they are raised in uninfected districts. Experience has shown that it is absolutely impossible for Marine-Hospital Service officers in China to make these certificates with any degree of certainty, and that even where all possible care is exercised, crates or baskets will be substituted, goods will be ambiguously or falsely manifested, and dangerous products thereby brought into these islands.

It is the belief of this office that so imminent is the danger of a recurrence at any time of the cholera epidemic which swept through these islands two years ago, through the introduction of infected fresh vegetables from China, that the health of the people of these islands, commercial stability, encouragement to capital to come here, all unite in imperatively demanding that the importation of certain fresh garden produce from China be absolutely prohibited. Articles such as celery, tomatoes, lettuce, and cabbage, which are generally eaten raw, constitute a daily menace to the welfare of these islands. These articles are imported from several safe countries, such as Japan and the United States, and it is believed that their importation from the latter country is becoming more and more practicable as time goes on. Whether this be so or not, the undersigned believes that the impracticability of enforcing the regulations against the importation of these articles either from China or from infected districts in China demands an absolute prohibition of their importation into these islands from that country.

It is understood that this is a matter of local quarantine regulation, and that the quarantine service here has full power to take this action.

Respectfully,

W. MORGAN SHUSTER,
Collector of Customs for the Philippine Islands.

Dr. V. G. HEISER,
Chief Quarantine Officer for the Philippine Islands.

In view of the statements contained in the foregoing letter, and, moreover, in view of the actual substitution of green vegetables for other articles which has been detected from

time to time, coupled with the fact that fresh garden produce from China is always open to suspicion, and, furthermore, since the Service has made every endeavor possible to regulate the importation of fresh vegetables during the past four years, and that these efforts have been repeatedly defeated by shippers at Hongkong, and, furthermore, since the records of this office show that cholera was in all probability introduced into the Philippine Islands by fresh vegetables from Hongkong, the following regulations were made:

"All vegetables and other produce from China which are ordinarily eaten raw, as, for instance, cabbage, lettuce, strawberries, and cauliflower, are refused admission into the Philippine Islands. Vegetables that ordinarily must be cooked before being eaten, or which, for commercial reasons, must necessarily be shipped in a dry condition, as, for instance, onions, potatoes, garlic, etc., will be admitted into the Philippine Islands, provided they be certified as safe by the Service officer stationed at the port of departure. In the event of an epidemic of cholera in the sections in which vegetables are grown, the importation of this latter class of vegetables will also be stopped during the prevalence of such epidemic."

Permits from this office are still required for all ships' stores which are landed in the Philippines. While this regulation causes perhaps a slight inconvenience in a few instances, yet the purpose which it serves fully justifies its continuance. It is only by knowing exactly what articles are landed here that an effective check may be had upon the landing of prohibited vegetables, or suspicious food stuffs. Until this system was adopted, it was no infrequent occurrence to find Chinese vegetables in Manila that never appeared upon the manifests of an incoming vessel.

At the request of the insular board of health, its regulations with regard to the shipment of hides were enforced. They provide that all hides must be accompanied with a certificate issued by the health officer stationed in the district in which the hides originate, which states that they have been taken from animals which were free from infection at the time they were killed.

CHOLERA.

The islands have remained entirely free from this disease from April, 1904, to August 23, 1905. Suspicious cases were reported at Iloilo, Fort McKinley, and Bilibid prison, Manila, but a careful bacteriological examination showed that the disease was not cholera.

At an autopsy held August 23, 1905, at Bilibid prison by Passed Asst. Surg. J. D. Long of this Service, he found some pathological changes which he considered extremely suspicious. Specimens were at once sent to the Government Laboratory for examination, and on August 25, 1905, the director of the biological laboratory, Dr. R. P. Strong, reported that the case was undoubtedly cholera. In the meantime cases were reported in the city outside of Bilibid, and by August 25 there was a rapid increase in the number of cases reported from almost all sections of the city. From the 23d to the 31st of August there were 51 cases with 45 deaths. The most searching investigation has been made as to the entrance of the disease, but so far it has been impossible to trace it to a source outside of the islands. Chinese vegetables and other cargo capable of conveying cholera infection have been prohibited since the appearance of cholera in Hongkong in June, so that this source of infection could practically be eliminated. Evidence is slowly accumulating that the cholera was present along the shores of the upper Pasig River before it made its appearance in Manila. A number of cases were reported as existing in Jala Jala August 20, 1905, but this information did not reach Manila until after the outbreak of the disease here.

While it is yet too early to make any statement that would have scientific value, yet the evidence up to the present time points to the fact that cholera is endemic in these islands, and that at times, for reasons which are not known at present, the organism assumes a virulent character and an epidemic of cholera is the result.

PLAGUE.

It is to be regretted extremely that our present knowledge with regard to the transmission of this disease has not been materially enhanced during the year. Of all the questions which confront the quarantine officer in the Orient this is probably the most important. It would seem, however, that this knowledge would soon be within our grasp. A most significant observation is the fact that for the last three years at least the increase and decrease in the number of cases takes place almost simultaneously at Fuchau, Amoy, Hongkong, Manila, and to a certain extent at Singapore, and very frequently occurs during the same month and same week at the places mentioned. These ports are distributed through more than 25 degrees of latitude, and the conditions and temperature vary very much on any given day. The largest number of cases occur during the months of May and June, after which there is a gradual decrease until December. During the latter month plague disappears almost entirely.

In the Philippines the plague situation shows a very great improvement. Plague is still confined to Manila and Cebú. A case was reported in Sámar, but upon investigation the diagnosis could not be confirmed. There was also one case in Cavite in May. None has been reported at that place since that date. In Manila the situation is much more favorable than in previous years. The number of cases averaged less than ever before. Last year there occurred from January to July 63 cases; this year, during the same period, there were 33 cases. By comparing the two years ended August 31, 1904 and 1905, respectively, the same ratio is maintained. In the year 1904 there were 101 cases as against 51 for 1905. The mortality for both years was over 90 per cent.

At Cebú the number of cases has remained about the same. During the year covered by the report for 1904 there were 19 cases and 14 deaths, and this year there were 20 cases and 18 deaths. The records of Manila last year revealed a great improvement over the previous year. This favorable showing was attributed to the extensive use of Shiga's prophylactic serum. This year showed a still greater improvement over the preceding year, yet there was a very limited amount of serum used. This fact merely demonstrates that as yet we do not know which of the measures used to combat plague are responsible for its control. The fact must not be lost sight of that while in preceding years serum was being extensively used, at the same time the sanitary condition of the houses was constantly undergoing improvement, and it may have been due to that fact that the number of cases was lessened.

Practically all the measures to prevent the spread of the disease to the other ports of the Philippines have been based upon the theory that the same means that will destroy rats will also prevent the conveyance of plague.

Plague was encountered on one vessel during the year. The case occurred in Cebú Harbor, and was probably contracted on shore at that port. No plague was detected on vessels from foreign ports. This was in all probability due to the careful inspection made by Service officers stationed in China and Japan.

SMALLPOX AND VACCINATION.

The systematic vaccination of the inhabitants of the islands, which is being done by the board of health, is keeping the disease in check. The Quarantine Service, however, has encountered more vessels with smallpox aboard this year than for any similar period since the Service has been in the islands.

No less than 18 vessels arrived with the disease on board. Thirty-three cases came under observation, 27 of which were actually removed from vessels, the remaining having developed during quarantine detention, during the incubation period, at the Mariveles quarantine station. Last year there were only 8 vessels on which the disease was found, which shows an increase this year of over 100 per cent.

In former years secondary cases were rare, but this year they were more common. The records show that though there were many thousands quarantined on account of this disease no secondary cases have occurred among cabin passengers. In view of this experience, it would appear that there is no necessity for quarantining cabin passengers, disinfection and vaccination of all those having been exposed being sufficient. Exceptions, however, shoul be made in the cases of those persons who have never been vaccinated.

The Mariveles quarantine station has had "contacts" in quarantine almost every week during the entire year. This was very trying on the personnel of the station because no one except medical officers were allowed to leave the reservation while there were suspects in detention.

The systematic vaccination of interisland crews was continued. Owing to an epidemic of smallpox at Shanghai all crews and steerage passengers from that port, between the months of January and June, were vaccinated.

During the year ended June 30, 1905, the Service in the islands vaccinated a grand total of 20,887 persons. Of these there were 6,771 members of crews vaccinated at Manila, with 3,393 known "takes." At Iloílo there were 4,387 persons vaccinated, with 1,096 known "takes." At Cebú there were 3,242, with 77 known "takes." At Manila the proportion of "takes" has been over 50 per cent There were probably more, but they did not come under observation.

June 15 a circular letter was sent to the agents of vessels and others concerned soliciting their assistance in the vaccination of crews. To this end they were requested not to hire any members of crews unless they had a vaccination certificate issued by the Service. In order that this might not work any hardship the owners were informed that all nonvaccinated persons whom they wished to employ could be first sent to the quarantine office where they would be vaccinated free of charge. The shipping interests entered heartily into this plan and it is hoped that the work will soon be completed. However, there will be quite a number of persons to be vaccinated in the years to come because it is the custom among many of

the natives of the provinces when they desire to visit Manila to ship as sailors, and in consequence they act as crew for one trip only with that vessel.

The systematic vaccination of crews is beginning to yield results. This is well shown by the fact that while there were many more vessels with smallpox this year than last yet the percentage of cases among crews was actually less.

During the year the vaccination of the city of Manila was completed. If the efficiency of vaccination needs any further confirmation this city presents a most convincing proof. Since time immemorial Manila has been afflicted with smallpox. The pits on the faces of the inhabitants bear ample testimony to this fact. Last year there were 87 cases, with 33 deaths; this year there were 39 cases, with 12 deaths. The cases this year occurred almost entirely among persons who were merely visitors to the city and came in overland. The few isolated cases developed in Manila occurred among persons who had escaped vaccination.

LEPROSY.

Cases of leprosy were detected on 3 vessels during the year. One other vessel carried 24 lepers, under the supervision of this office, from the Palestina leper colony to San Lázaro at Manila. The vessels were thoroughly disinfected and all other precautions taken.

NONQUARANTINABLE DISEASES ENCOUNTERED ON VESSELS.

The following diseases were observed on vessels, other than quarantinable:

Dysentery, 22; diphtheria, 1; tuberculosis, 7; typhoid fever, 2; beriberi, 79; malarial fever, 24; wounded in battle (including Russian sailors), 271.

From the foregoing it will be seen that of the actual diseases encountered beriberi heads the list. The entire crew of one sailing vessel, the *Minerva II*, was completely disabled. The vessel was bound from Saigon to Manila and reached this port only after several months spent on a voyage that is ordinarily completed in eight or nine days.

It has become the practice of the Service to disinfect the living quarters of all vessels on which beriberi is found on arrival.

Typhoid fever is a rather uncommon disease in the Philippine Islands, and, except in rare instances, is believed to occur only in persons who have either just arrived from other countries or in those who have partaken of some food that has been imported from countries in which the disease prevails. It has been suggested that the organism is probably imported with raw oysters and in a Japanese food called "ikon," which is imported from Japan by Japanese residents in the Philippines. In view of the foregoing the question as to whether typhoid fever should not be placed upon the list of quarantinable diseases is now receiving serious consideration, and it is hoped that concrete recommendations can be made in a short time.

AID TO OTHER SERVICES.

1 *Board of marine examiners.*—During the year there were 703 physical examinations made of masters, mates, engineers, pilots, and other ship's officers in accordance with section 3 of Act No. 780 of the Philippine Commission, which states that "applicants must be physically sound." These examinations are fairly rigid and compare in scope with those made of applicants to the United States Life-Saving and Revenue-Cutter Service. There were 70 rejections.

2. *Immigration service.*—There were inspected 2,951 immigrants; 167 were certified for rejection.

3. *Board of health.*—Vessels were disinfected upon its request on account of having had rinderpest or other cattle diseases aboard.

4. *Bureau of education.*—Cadets of the Nautical School were given a physical examination in order to determine whether they would make fit candidates, physically, for positions in the merchant marine.

5. *Bureau of coast guard and transportation.*—Officers and sailors were physically examined to determine their fitness for positions on coast guard vessels.

6. *Bureau of coast and geodetic survey.*—Two boards of Service officers were convened for the purpose of examining sick officers of the Coast and Geodetic Service, with a view to making recommendations regarding their treatment.

7. *The Philippine civil-service board.*—Special physical examinations were made at its request of candidates whose physical status was doubtful. Examination papers were also examined and marked whenever requested.

FLOATING EQUIPMENT.

The floating equipment of the Service has been maintained in a high state of efficiency during the year. A new boiler was placed in the launch *Zapote* and a new propeller and tail shaft installed.

It is estimated that the launch at Manila steams at least 50 miles each day. In view of the fact that the launch is needed every day, at all hours, Sundays and holidays included, there is not sufficient time for repairs, and it is deemed to be more economical to have two launches, so that one of them can act as a relief launch. The only extra crew required is one fireman and one sailor, at $17.50 and $10 per month, respectively. In accordance with the foregoing, a launch, the appropriation for which was mentioned in the last annual report, was secured during the year and placed in commission at Manila.

It is a steam, 40-foot, cockpit type launch, with a 40-horsepower compound condensing engine of modern design, and has a vertical water-tube boiler. The cockpit is divided into compartments. A forward one for the helmsman, with a sufficient seating capacity to accommodate two vaccinators and two disinfectors. The next compartment contains the engine, boiler, pumps, and other machinery, and coal bins. The next compartment is entirely inclosed, and is entered through a hatch from the deck. It serves as a cargo hold, and is used as a place to store away sulphur pots and pans, sulphur, and other cargo required upon a quarantine launch. The after compartment is fitted up as a cabin, which has a seating capacity for 12 persons. The floor is covered with heavy rubber, the seats are upholstered. The cabin is finished with hard wood. The entire cockpit is covered with a canopy awning, with side curtains. The hull is constructed in a substantial manner. All fastenings are copper. The frame and keel are of dungon, the planking Oregon pine, and the deck and coamings of teak. The hull is covered to well above the waterline with 16-ounce Muntz metal. The rudder is of brass. Heavy cleats, bolts, and crosses of brass are securely fastened to the deck. The draft of the vessel is about 3 feet 6 inches. The engine is of the compound type, with keel-surface condensers. There are two pumps connected directly to the crossheads. One separate donkey pump, which can be used either for the boiler or bilge. There is also a steam siphon for the bilge, as well as a hand pump, which can be screwed into a connection on deck. The propeller and tail shaft are of bronze. The launch has one water tank forward and one on each side aft, all so connected that they can be used either as feed or trimming tanks. The coal bins have a capacity of 1 ton. The boiler is of the water-tube type, with brass tubes, which are so arranged that any one of them can be easily removed for repairs and replaced. The launch was built in Manila, directly under the supervision of this office, and cost $3,985.50. The launch has been named the *Mercury*.

The launch at Cebú received an extensive overhauling during the year, and is now in first-class condition. The bids received at Cebú for this work were considered to be too high, and the launch was taken to Iloílo, where the contract was let for nearly one-half the lowest bid received at Cebú. Total price of repairs, $958.73.

The launch at Iloílo is also in fair condition, except that the copper sheathing must be renewed this year. The disinfecting barges *Esmeralda* and *Protection*, located at Iloílo and Cebú, respectively, are in fairly good condition.

INTERISLAND QUARANTINE.

Early during the year it was the intention to recommend that the quarantine inspection upon the arrival of all interisland vessels be discontinued. The great number of vessels that arrived at Manila with smallpox on board made the advisability of such action questionable. The inspection, however, was entirely discontinued at all ports except Manila, Iloílo, and Cebú. At first sight an inspection at these ports only would probably appear somewhat inconsistent, but it should be remembered that nearly all of the interisland vessels visit at least one of the above ports practically every trip they make, and furthermore, when it is considered that the inspection is made principally for the purpose of maintaining vessels in a good sanitary condition, the matter assumes a new aspect. At the present time the status of the interisland shipping is such that unless the quarantine service looked after its sanitary conditions, no one else would. In spite of the constant supervision, the sanitary condition of the interisland vessels is not all that could be desired. If no official inspection were made, their condition could well be imagined, especially by those who have had experience with crews of interisland vessels.

In March, 1905, the governor-general appointed a committee composed of Maj. Gen. Henry C. Corbin, U. S. Army; W. Cameron Forbes, member of the commission and secretary of commerce and police, and H. B. McCoy, deputy collector of customs. This committee had for its object the study of the condition of the interisland shipping, and especially to recommend legislation with a view to lessening the restrictions. The undersigned was invited to appear before this committee, and at the conference the reasons for continuing the quarantine inspections were fully explained. The committee concurred in the necessity of inspection for the present at least. It was pointed out that the Government was about to enter into a contract for carrying Government passengers and freight, and it was suggested that a rigid clause with regard to the sanitary condition of vessels be inserted in the contract. If the provisions of the clause were properly

enforced, it was thought, unless there be an epidemic actually present, that the inspection might be discontinued. After further discussion it was agreed that the issuance of bills of health for interisland vessels might be discontinued. The following circular letter was then issued:

[Circular letter.]

UNITED STATES TREASURY DEPARTMENT,
PUBLIC HEALTH AND MARINE-HOSPITAL SERVICE,
OFFICE OF THE CHIEF QUARANTINE OFFICER
FOR THE PHILIPPINE ISLANDS,
Manila, P. I., April 26, 1905.

To the owners, agents, and masters of vessels and others concerned.

SIRS: After May 15, 1905, it will not be necessary for masters of vessels commencing a voyage at one port in the Philippine Islands to another port in the Philippine Islands to obtain the bill of health issued by the officers of this Service which heretofore has been required.

Respectfully,

VICTOR G. HEISER,
Passed Assistant Surgeon,
Chief Quarantine Officer for the Philippine Islands.

If the sanitary condition of the islands continues to improve and provision be made for maintaining vessels in good sanitary condition, there is no reason known at present why quarantine inspection on arrival of interisland craft should not be confined to those vessels which actually have sickness aboard.

CEBÚ QUARANTINE STATION.

Since the last annual report was made the difficulties with regard to the title of the land have been settled, and the construction of the station is three-fourths completed. The governor-general set aside the land for the use of the service by executive order No. 43 of October 25, 1904.

The station when completed will consist of the following structures:

1. Wharf and approach at which vessels of a draft up to 18 feet can come alongside at low tide.
2. Surgeon's residence, built on the bungalow type with 5 rooms and a kitchen.
3. Disinfecting building, 20 by 60 feet, one story in height; will be divided into an infected and noninfected end, a room used as an office, and one as a laboratory. The equipment will consist of one 16-foot Kinyoun-Francis steam chamber with formaldehyde attachment, and a 40-horsepower boiler, autoclaves, bichloride pumps, etc.
4. Bath house, 40 by 13 feet, to be divided into 3 sets of compartments for cabin passengers, and 14 individual bathrooms for steerage passengers.
5. Steerage barracks: One story, bungalow type, 70 by 36 feet; will be divided into dormitory for males with 74 berths and dormitory for females with 6 berths; ample toilet facilities are provided for: if more segregation is necessary, tents can be used.
6. Cabin passengers' barracks: One-story building, 50 by 24 feet; to be divided into 8 bedrooms, each of which will contain two beds.
7. Attendants' quarters: One-story building, 32 by 22 feet, to be divided into 4 rooms.
8. The hospital will consist of 3 isolated pavilions, 12 by 12 feet, with cement floors.
9. Fences will be constructed of barbed wire.
10. Water and sewer system: It is expected to obtain water from an artesian well, which will be drilled on the station grounds. A windmill with a pumping capacity of about 1,000 gallons per hour to a distributing tank placed 20 feet above the ground will be constructed. Running water, with a sewer, will be provided for all buildings.

The contract for the construction of the station was let to the California-Manila Lumber and Commercial Company for ₱41,276.85, and is to be completed in the early part of September. Unavoidable delays in obtaining piles will possibly cause the date of completion to be postponed for several weeks.

IMMIGRATION.

The period covered by this report makes the second year during which immigrants to the Philippines have been physically examined upon arrival. The inspection is still done on the deck of the vessel which brings them. The entire lack of a suitable place to keep the immigrants under observation for a few days in order to complete the diagnosis has been a serious handicap in conducting the inspections in a satisfactory manner. This drawback has become more apparent since the observation of Asst. Surg. R. H. Creel that immigrants are in the habit of instilling adrenalin into the eyes for the purpose of removing physical signs of

trachoma. The use of adrenalin in cases of trachoma removes almost all traces of the disease for a short time and renders the diagnosis correspondingly difficult. An effort will be made during the coming year to have the inspections made under more favorable circumstances, so that the medical officer may be certain that no adrenalin has been instilled at least several hours before he makes his examination.

During the year there were 2,951 immigrants inspected at the several ports of entry to the Philippine Islands. Of this number there were 167 certified, of which 130 were actually deported, which gives a percentage of 44 deported The difference of 37 in the number of rejections and actual deportations is accounted for as follows: Thirty-three are still pending, because they are cases of tracohma in Chinamen, and the question of whether the immigration law applies to Chinamen is still awaiting decision by the Philippine authorities. Two cases of trachoma were landed by direction of the governor-general, and the remaining two escaped from vessels while awaiting deportation.

The foregoing figures will show that the percentage of deportations, as compared with the certifications, is larger than heretofore reported from any port at which the Service inspects aliens. This is accounted for by the fact that the causes for certification are almost all due to trachoma, and therefore fall into one of the absolutely excludable classes.

Rejections by race were as follows: Japanese, 105; Chinese, 41; East Indians, 17; Portuguese, 3; Africans, 1.

Unfortunately the percentage of rejections for the year was much higher than last year. With a view to ascertaining the cause for this increase, the undersigned in January, in accordance with official orders, visited the Japanese ports at which immigrants embark for the Philippines. This investigation showed beyond a reasonable doubt that substitution was common—that is to say, sound persons would present themselves to the examining officer, and upon their being passed the certificate to that effect would be transferred to immigrants who had not been inspected, but who actually wanted to go to the Philippines, and the latter, of course, go aboard without hindrance. Another reason for cases arriving in the Philippines is the fact that adrenalin was used at the port of embarkation, and on that account cases of trachoma were probably not detected. At one of the Japanese ports a hospital maintained by immigration agents for the treatment of cases of trachoma or of suspected trachoma in prospective immigrants was in active operation. The manner in which the examination for entrance into this hospital was made probably accounted for the large number of cases observed at the ports of arrival that apparently develop during the voyage. The writer saw an examining doctor pass his finger over the mucous membrane of the inverted eyelid of a marked case of trachoma and then repeat this operation immediately afterwards, without cleaning or disinfecting his hands, with a prospective immigrant whose eyes were apparently normal. When it is remembered that diagnosis is obscured by treatment and, in addition, that there is ample opportunity for nontrachomatous subjects to become infected before embarkation, it is not to be wondered at that trachoma should be found among immigrants at ports of arrival, even though the Service medical officer has made a careful examination.

Suggestions with a view to correcting these conditions were made, and since that date the percentage of rejections at the ports of arrival in the Philippines has fallen to 3⅓ per cent.

EXPENDITURES.

At the close of the last fiscal year the unexpended balances, with the exception of the appropriation for new construction and permanent repairs, reverted to the Treasury, in amount, ₱22,030.94. The amount received from all sources during the fiscal year 1905, including appropriations and refunds, amounted to ₱153,207. The total expenditures authorized during the same period were ₱142,492.98, leaving a balance at the end of the fiscal year ended June 30, 1905, of ₱10,714.02, which will revert to the treasury. The amounts are, perhaps, not absolutely accurate, because the exact amount of some of the bills contracted during the latter part of the fiscal year is not yet known.

These expenditures include all running expenses, improvements, and repairs, as well as the ₱12,000 which was set aside until used for repairs to the buildings and wharf at the Mariveles quarantine station and the extension of the water system. A detailed financial statement is submitted herewith.

MISCELLANEOUS.

Circular letters, statistics, reports of substations, and the financial statement follow.

[Circular letter.]

UNITED STATES TREASURY DEPARTMENT,
PUBLIC HEALTH AND MARINE-HOSPITAL SERVICE,
OFFICE OF THE CHIEF QUARANTINE OFFICER
FOR THE PHILIPPINE ISLANDS,
Manila, P. I., September 6, 1904.

To masters, agents, and owners of vessels and others concerned, Manila, P. I.

SIRS: In order that the hours for the quarantine inspection of vessels which are bound from interisland ports to Manila may be made still more convenient for the shipping interests and others concerned, the masters of vessels are hereby informed that if they so desire they may call at Mariveles for inspection and pratique whenever they find that they can reach that port before sunset, and that it would be impossible for them to reach Manila before that hour.

This does not apply to any vessel from a foreign port via island ports.

Respectfully,

VICTOR G. HEISER,
Passed Assistant Surgeon, Chief Quarantine Officer for the Philippine Islands.

[Circular letter.]

UNITED STATES TREASURY DEPARTMENT,
PUBLIC HEALTH AND MARINE-HOSPITAL SERVICE,
OFFICE OF THE CHIEF QUARANTINE OFFICER,
FOR THE PHILIPPINE ISLANDS,
Manila, P. I., September 7, 1904.

SIR: You are hereby directed to forward to this office on September 15 and March 15 of each year a requisition for all the supplies needed at your station for the six months commencing October 1 and April 1 of each year.

Respectfully,

VICTOR G. HEISER,
Passed Assistant Surgeon,
Chief Quarantine Officer for the Philippine Islands.

MEDICAL OFFICER IN COMMAND,
U. S. PUBLIC HEALTH AND MARINE-HOSPITAL SERVICE,
Philippine Islands.

[Circular letter.]

UNITED STATES TREASURY DEPARTMENT,
PUBLIC HEALTH AND MARINE-HOSPITAL SERVICE,
OFFICE OF THE CHIEF QUARANTINE OFFICER
FOR THE PHILIPPINE ISLANDS,
Manila, P. I., October 12, 1904.

SIR: You are hereby requested to report upon the advisability of lessening the restrictions placed upon vessels at your port. Information is particularly desired as to whether the regular quarantine inspection of interisland boats could not be dispensed with for many of the boats that enter from the nearby ports.

Respectfully,

VICTOR G. HEISER,
Passed Assistant Surgeon,
Chief Quarantine Officer for the Philippine Islands.

MEDICAL OFFICER IN COMMAND
U. S. PUBLIC HEALTH AND MARINE-HOSPITAL SERVICE,
Philippine Islands.

[Circular letter.]

UNITED STATES TREASURY DEPARTMENT,
PUBLIC HEALTH AND MARINE-HOSPITAL SERVICE,
OFFICE OF THE CHIEF QUARANTINE OFFICER
FOR THE PHILIPPINE ISLANDS,
Manila, P. I., October 25, 1904.

United States quarantine officers and others concerned.

SIRS: I have to inclose herewith a copy of a letter sent this day to the chief quartermaster Philippines division, with regard to the inspection of certain interisland transports. You will act in accordance with the provisions embraced therein.

Respectfully,

VICTOR G. HEISER,
Passed Assistant Surgeon,
Chief Quarantine Officer for the Philippine Islands.

[Inclosure.]

UNITED STATES TREASURY DEPARTMENT,
PUBLIC HEALTH AND MARINE-HOSPITAL SERVICE,
OFFICE OF THE CHIEF QUARANTINE OFFICER
FOR THE PHILIPPINE ISLANDS,
Manila, P. I., October 25, 1904.

SIR: Owing to the favorable sanitary reports which have been received during the past month with regard to the quarantinable diseases in the Philippine Islands, I have the honor to state that it will be no longer necessary for the interisland army transports, which carry as part of their personnel army medical officers, to procure bills of health at ports of departure or to await quarantine inspection at ports of arrival, unless there is sickness aboard, in which event inspection by the quarantine officer should be awaited as in the past.

Respectfully,

VICTOR G. HEISER,
Passed Assistant Surgeon,
Chief Quarantine Officer for the Philippine Islands.

The CHIEF QUARTERMASTER, PHILIPPINES DIVISION, UNITED STATES ARMY,
Manila, P. I.

[Circular cablegram.]

QUARANTINE OFFICE, MANILA, P. I.,
October 28, 1904.

Smallpox epidemic Siquijor; also many cases Surigao and Marinduque.

HEISER,
Chief Quarantine Officer.

QUARANTINE OFFICER, *Philippine Islands.*

[Circular cablegram.]

QUARANTINE OFFICE, MANILA, P. I.,
December 14, 1904.

Cholera reported at Labuan, Borneo.

HEISER,
Chief Quarantine Officer.

QUARANTINE OFFICER, *Philippine Islands.*

[Circular letter.]

UNITED STATES TREASURY DEPARTMENT,
PUBLIC HEALTH AND MARINE-HOSPITAL SERVICE,
OFFICE OF THE CHIEF QUARANTINE OFFICER
FOR THE PHILIPPINE ISLANDS,
Manila, P. I., March 2, 1905.

SIR: I have to inform you that during the latter part of February the American consuls and consular surgeons stationed on the China coast were advised as follows:

"It is respectfully requested that you refuse to permit the shipment from China and Singapore to the Philippines of such vegetables and other products which are ordinarily eaten raw, as, for instance, cabbage, celery, lettuce, strawberries, and cauliflower. There will be no objection to vegetables entering the Philippines which ordinarily are cooked before being eaten or which, for commercial reasons, must necessarily be thoroughly dried before being shipped, as, for instance, onions, potatoes, garlic, etc., provided they are certified to by you as having been grown in noninfected districts."

Respectfully,

VICTOR G. HEISER,
Passed Assistant Surgeon,
Chief Quarantine Officer for the Philippine Islands.

MEDICAL OFFICER IN COMMAND,
U. S. PUBLIC HEALTH AND MARINE-HOSPITAL SERVICE,
Philippine Islands.

[Circular letter.]

UNITED STATES TREASURY DEPARTMENT,
PUBLIC HEALTH AND MARINE-HOSPITAL SERVICE,
OFFICE OF THE CHIEF QUARANTINE OFFICER,
FOR THE PHILIPPINE ISLANDS,
Manila, P. I., April 25, 1905.

To the owners, agents, and masters of vessels and others concerned.

SIRS: After May 15, 1905, it will not be necessary for masters of vessels commencing a voyage from one port in the Philippine Islands to another port in the Philippine Islands to obtain the bill of health issued by the officers of this Service which heretofore has been required.

Respectfully,

VICTOR G. HEISER,
Passed Assistant Surgeon,
Chief Quarantine Officer for the Philippine Islands.

[Circular letter.]

UNITED STATES TREASURY DEPARTMENT,
PUBLIC HEALTH AND MARINE-HOSPITAL SERVICE,
OFFICE OF THE CHIEF QUARANTINE OFFICER,
FOR THE PHILIPPINE ISLANDS,
Manila, P. I., April 29, 1905.

Quarantine officers, collectors of customs, and others concerned.

SIRS: I have to inclose herewith a circular letter issued by this office April 26, 1905, which discontinues the issuance by this Service of bills of health to vessels commencing a voyage from one port in the Philippine Island to another port in the Philippine Islands. You are requested to make the provisions of this circular effective at your port from the date mentioned and to give said order the necessary publicity.

Respectfully,

VICTOR G. HEISER,
Passed Assistant Surgeon,
Chief Quarantine Officer for the Philippine Islands.

[Circular letter.]

UNITED STATES TREASURY DEPARTMENT,
PUBLIC HEALTH AND MARINE-HOSPITAL SERVICE,
OFFICE OF THE CHIEF QUARANTINE OFFICER
FOR THE PHILIPPINE ISLANDS,
Manila, P. I., May 16, 1905.

MEDICAL OFFICER IN COMMAND,
U. S. PUBLIC HEALTH AND MARINE-HOSPITAL SERVICE,
Philippine Islands.

SIR: I have to inclose herewith for your information copy of a letter sent to the United States consul at Amoy. You are directed to treat vessels from that port in accordance with the requirements contained therein.

Respectfully,

VICTOR G. HEISER,
Passed Assistant Surgeon,
Chief Quarantine Officer for the Philippine Islands.

[Inclosure.]

UNITED STATES TREASURY DEPARTMENT,
PUBLIC HEALTH AND MARINE-HOSPITAL SERVICE,
OFFICE OF THE CHIEF QUARANTINE OFFICER
FOR THE PHILIPPINE ISLANDS,
Manila, P. I., May 16, 1905.

SIR: In view of the fact that the number of cases of plague is rapidly increasing in and about Amoy, I have to state that hereafter vessels entering ports of the Philippine Islands from Amoy, which carry steerage passengers, or passengers who ordinarily travel as such, will have to undergo a detention of seven days, which is to date from the time disinfection of the vessel is completed in the Philippines. If, however, you could make arrangements to quarantine the passengers who ordinarily take steerage accommodations at Amoy for the period of seven days, and such passengers are accompanied by a certificate from you to the effect that they have undergone such detention, and that no quarantinable disease has made its appearance among them, the vessel bringing such passengers will only be subjected to the usual disinfection before being granted pratique.

Respectfully,

VICTOR G. HEISER,
Passed Assistant Surgeon,
Chief Quarantine Officer for the Philippine Islands.

The AMERICAN CONSUL,
Amoy, China.

[Circular letter.]

UNITED STATES TREASURY DEPARTMENT,
PUBLIC HEALTH AND MARINE-HOSPITAL SERVICE,
OFFICE OF THE CHIEF QUARANTINE OFFICER
FOR THE PHILIPPINE ISLANDS,
Manila, P. I., June 15, 1905.

To the masters, owners, and agents of vessels, and others concerned.

SIRS: Your attention is called to the fact that during the past four years the quarantine service has endeavored to vaccinate the crews of all vessels plying between ports of the Philippine Islands.

In order to lessen the liability of smallpox occurring among the crews on vessels and to reduce to a minimum the necessity for placing crews in quarantine when smallpox is detected, this office asks your cooperation to the end that no new members of crews be employed who do not possess blue cards issued by this Service. When any person applies for a position aboard your vessels he should be required to show a quarantine service blue vaccination card. If he does not have one he should be sent to this office at once to be vaccinated before allowing him to go aboard. By giving us your assistance in this matter commerce will be facilitated, your interests will be benefited, and the necessity for quarantining your vessels on account of unprotected members of the crew will be avoided.

Respectfully,

VICTOR G. HEISER,
Passed Assistant Surgeon,
Chief Quarantine Officer for the Philippine Islands.

[Circular letter.]

UNITED STATES TREASURY DEPARTMENT,
PUBLIC HEALTH AND MARINE-HOSPITAL SERVICE,
OFFICE OF THE CHIEF QUARANTINE OFFICER
FOR THE PHILIPPINE ISLANDS,
Manila, P. I., June 16, 1905.

Quarantine officers, signal stations, and others concerned.

SIRS: You are hereby requested to address all official telegrams sent to this office, "Quarantine, Manila," and not "Heiser, Manila," as heretofore.

Respectfully,

VICTOR G. HEISER,
Passed Assistant Surgeon,
Chief Quarantine Officer for the Philippine Islands.

UNITED STATES TREASURY DEPARTMENT,
PUBLIC HEALTH AND MARINE-HOSPITAL SERVICE,
OFFICE OF THE CHIEF QUARANTINE OFFICER
FOR THE PHILIPPINE ISLANDS,
Manila P. I., August 26, 1905.

To the owners and agents of vessels, Manila, P. I.

SIRS: Hereafter all vessels leaving Manila for other ports in the Philippine Islands will be required to obtain a bill of health at this office.

Owing to the presence of cholera in Manila, vessels leaving Manila for other ports in the Philippines will be subject to the following regulations before being allowed to sail:

All vessels after loading cargo and with all crew and all passengers on board must proceed to the Mariveles quarantine station and report to the medical officer in charge.

Vessels whose first port is Iloílo or Cebú will be held at Mariveles a sufficient time so that they may arrive at Iloílo or Cebú five days from the hour of departure from Manila, provided no sickness has appeared on board.

Vessels bound for other ports in the Philippines will be held five full days at Mariveles before being allowed to sail.

No fresh vegetables or fruits shall be taken as cargo.

All vessels should have at least two weeks' supply of food on board before leaving Manila.

The above goes into effect immediately.

Respectfully,

VICTOR G. HEISER,
Passed Assistant Surgeon,
Chief Quarantine Officer for the Philippine Islands.

UNITED STATES TREASURY DEPARTMENT,
PUBLIC HEALTH AND MARINE-HOSPITAL SERVICE,
OFFICE OF THE CHIEF QUARANTINE OFFICER
FOR THE PHILIPPINE ISLANDS,
Manila, P. I., August 31, 1905.

To shippers, shipping agents, owners, and others concerned, Manila, P. I.

SIRS: In response to many requests as to the nature and class of cargo that may be taken to ports in the Philippines during the prevalence of cholera, the following is issued:

All articles of general cargo, other than food products or personal or household effects of those dead of or exposed to infectious diseases, may be taken.

Personal or household effects so exposed to be disinfected prior to being loaded or received in the warehouses.

The following food products may be taken: Canned goods of all kinds, dried fruits and vegetables of all kinds, if thoroughly dried; meats, fish, except fresh oysters; onions, garlic, tomatoes, rice, beets, oranges, lemons, limes, apples, pears, pumoloes, cheese, bananas, fowls, animals, cocoanuts.

The following class of articles should not be taken, either as cargo or ship's stores: Cabbage, lettuce, celery, greens of any kind, green onions, lanzones, mangoes, pineapples, fresh butter, fresh milk, chicos, fresh oysters, native fruits and vegetables generally, unless thoroughly dried; buyo, shell fish of any kind in the fresh state, camarones or bogong, native dulces or sweets, or native food of any class that can be eaten without previously cooking.

Respectfully,

VICTOR G. HEISER,
Passed Assistant Surgeon,
Chief Quarantine Officer for the Philippine Islands.

Report of the patients treated in the pest hospital at the Mariveles quarantine station during the year ended August 31, 1905.

Disease.	Cases.	Nationality.		Result.		
		Filipinos.	Americans.	Improved.	Recovered.	Died.
Smallpox	19	19	.....	.....	18	[a] 1
Total	19	19	.....	.....	18	1

[a] One patient had smallpox and dysentery; died from dysentery.

Report of the patients with nonquarantinable diseases treated at the Mariveles quarantine station during the year ended August 31, 1905.

Disease.	Cases.	Nationality.		Result.		
		Filipinos.	Americans.	Improved.	Recovered.	Died.
Typhoid fever	1	.....	1	.....	1	.....
Dysentery, chronic	26	26	.....	17	.....	9
Beri beri	14	14	.....	8	1	5
Tubercle of lungs	5	5	.....	3	.....	2
Rheumatism, chronic	1	1	.....	1	.....	.....
Insanity, delusional	1	1	.....	1	.....	.....
Gunshot wound and fracture	1	1	.....	1	.....	.....
Total	49	48	1	31	2	16

Statistics of quarantine transactions at the port of Manila, P. I., for the year ended August 31, 1905.

INCOMING.

Month.	Vessels inspected from—		Vessels in quarantine.	Vessels disinfected.	Bills of health issued.	Pieces of baggage disinfected.	Baggage inspected and passed.
	Foreign ports.	Domestic ports.					
1904.							
September	50	192	.....	23	274	.....	.....
October	56	247	2	25	300	3,204	.....
November	62	223	4	28	275	3,527	.....
December	46	231	.....	23	307	1,248	.....
1905.							
January	50	237	3	24	282	1,677	.....
February	51	256	5	19	299	1,746	.....
March	42	207	4	42	387	4,681	.....
April	48	281	4	30	319	3,339	.....
May	70	296	3	23	190	2,848	.....
June	52	207	5	18	57	4,657	.....
July	44	208	1	19	48	.....	.....
August	53	205	.....	8	101	.....	.....
Total	624	2,700	31	282	2,839	26,927	.....

Statistics of quarantine transactions at the port of Manila, P. I., for the year ended August 31, 1905—Continued.

INCOMING—Continued.

Month	Crew inspected	Passengers inspected		Persons vaccinated.		Persons bathed and effects disinfected	Persons quarantined (suspects).
		Cabin	Steerage	Crew.	Passengers.		
1904							
September	9,338	1,126	3,722	444	1		
October	11,250	1 725	6 299	782	152	1,156	155
November	12,214	1,370	6,030	745	23	1,287	60
December	9,843	1,394	5,948	548	60	406	
1905							
January	11,117	1,210	6,693	609	191	561	177
February	10 358	1,025	4,775	1,797	42	791	857
March	10,238	1,506	9 002	797	55	1,565	90
April	11,551	1,543	5 652	898	15	1,358	164
May	12 506	1 675	7 571	805	144	944	391
June	11,617	1,632	7 420	845	1,382	1,592	1 502
July	9,857	1,341	5 042	767	51		14
August	10,175	1,039	3 503	461	12		
Total	130,154	16,662	71 625	9 400	2 128	9,660	3 500

OUTGOING.

Month.	Vessels inspected.	Vessels in quarantine.	Vessels disinfected.	Vessels remanded to Mariveles.	Pieces baggage disinfected.
1904.					
September	6		6		732
October	10		8		1,212
November	5		3		1,946
December	9		4		1,923
1905.					
January	5		4		1,926
February	4		3		1,483
March	8		7		2,730
April	7		3		1,861
May	12		6		2,521
June	3		1		2,304
July	9		6		2,452
August	38	28	3	28	3,374
Total	116	28	54	28	24,464

Month.	Pieces baggage inspected and passed.	Crew inspected.	Crew quarantined.	Passengers inspected.
1904.				
September	1,006	528		544
October	942	521		656
November	961	305		671
December	2,078	535		1,081
1905.				
January	2,449	448		1,028
February	2,017	271		799
March	3,827	825		1,370
April	3,213	444		1,050
May	2 514	435		1,320
June	2,206	286		1,240
July	2,044	387		1,066
August	1,953	2,663	981	2,026
Total	25,210	7,648	981	12,851

Statistics of quarantine transactions at the port of Manila, P. I., for the year ended August 31, 1905—Continued.

OUTGOING—Continued.

Month.	Passengers quarantined.		Persons vaccinated.	Bathed and clothing disinfected.
	Cabin.	Steerage.		
1904.				
September				543
October				662
November				742
December			43	1,123
1905.				
January			14	1,187
February			46	825
March			34	1,326
April			50	928
May				1,340
June			1,401	1,232
July			11	2,452
August	44	282		1,373
Total	44	282	1,729	13,733

Summary of quarantine transactions at Manila, P. I., during the year ended August 31, 1905.

	Number.		Number.
Vessels inspected	3,530	Cases of quarantinable diseases detected among persons in quarantine, smallpox	6
Vessels detained in quarantine	59	Persons detained in quarantine	4,807
Vessels disinfected	88	Crew inspected	137,802
Vessels fumigated to kill vermin	194	Passengers inspected	101,130
Bills of health issued	2,839	Persons vaccinated	13,356
Pieces of baggage disinfected	51,391	Persons bathed and effects disinfected	23,393
Pieces of baggage inspected and passed	25,210		
Cases of quarantinable diseases detected on vessels:			
Smallpox	17		
Suspected cholera	1		
Leprosy	25		

Report of inspection of aliens at port of Manila, P. I., during the year ended August 31, 1905.

Month.	Inspected.	Certified.	Deported.	Cause of deportation.
1904.				
September	245	14	14	Trachoma.
October	327	69	68	66 trachoma (1 trachoma escaped); 1 syphilis; 2 poor physique; tuberculosis (?); trachoma (?).
November	220	8	6	5 trachoma; 1 trachoma (?); 2 trachoma, aliens, landed.
December	223	2	2	Trachoma.
1905.				
January	237	2	2	Do.
February	176	9	8	Trachoma; 1 trachoma escaped.
March	174	3	2	Trachoma.
April	167	4	5	Do.
May	97	6	4	Do.
June	215	4	6	Do.
July	124	5	4	Do.
August	125	1	2	Do.
Total	2,330	127	123	

UNITED STATES TREASURY DEPARTMENT,
PUBLIC HEALTH AND MARINE-HOSPITAL SERVICE,
OFFICE OF THE UNITED STATES QUARANTINE OFFICER,
Iloilo, P. I., June 30, 1905.

SIR: I have the honor to render the following report of quarantine transactions at this port for the year ending June 30, 1905:

All vessels entering this port are inspected, except those from nearby ports.

SMALLPOX.

Several vessels have been treated on account of smallpox; the cases were isolated on our disinfecting barge *Esmeralda;* the contacts were held on the vessel on which they arrived after disinfection. Two vessels were remanded to Manila by direction of the chief quarantine officer; one developed a second case en route to that port.

LEPROSY.

One case of leprosy was excluded under the immigration laws. The room occupied by the patient was disinfected, and the leper was isolated on board for the return trip.

No other quarantinable diseases have been encountered during the year.

DISINFECTION.

The only disinfection done has been that required by the above-mentioned diseases.

FUMIGATION.

For the purpose of destroying vermin, interisland and foreign vessels, whenever practicable, have been fumigated with sulphur dioxide. We have endeavored to do this at least twice during the year in the case of each vessel.

VACCINATION.

Thousands of persons have been vaccinated, but the virus used has failed to give any reasonable percentage of "takes." The best that we have ordinarily been able to get is a strawberry excrescence. Making due allowance for revaccinations and persons naturally immune, I am convinced that the virus has been for the most part inert.

AUTOPSIES.

The only autopsy that has been performed was on the body of a native found dead on a schooner in the harbor. The cause of the death was organic heart disease.

SANITARY CONDITIONS OF PORT AND SURROUNDING COUNTRY.

So far as quarantinable disease is concerned, this city and the island of Panay have remained clean except for one case of smallpox reported from the pueblo of Sara; in this case the diagnosis may be doubted. During the year the island of Negros has had some smallpox, but there has been no serious epidemic. At present the disease has practically disappeared. Many cases of chicken pox have occurred in this city. Some of them strikingly resemble smallpox. I have seen men with large experience with both diseases in doubt about a given case. Leprosy is common enough in the outlying parts of the city. No attempt at isolation is made.

In November and December, 1904, a very widespread and fatal epidemic of what was called malarial fever prevailed in the interior of Panay. None of the cases were seen by physicians, there being none in the interior, so that I do not know if the popular diagnosis was correct.

At a time when so much is being written about anchylostomiasis, it may be of interest to note that is a very common disease in this vicinity. A few very severe infections are seen, many mild ones, but in the majority of cases the parasite seems to cause no inconvenience.

Malaria, dysentery, and beri beri are, of course, always with us. A disease locally called "eclampsia" is, at certain seasons, the cause of a very heavy mortality among infants. I have been unable to learn anything about the pathology of the malady.

Respectfully,

GEORGE W. McCOY,
Assistant Surgeon.

The CHIEF QUARANTINE OFFICER FOR THE PHILIPPINE ISLANDS.

Statistics of quarantine transactions at the port of Iloilo, P. I., for the year ended August 31, 1905.

INCOMING.

Month.	Vessels inspected from—		Vessels in quarantine.	Vessels disinfected.	Bills of health issued.	Pieces of baggage disinfected, inspected, and passed.
	Foreign ports.	Domestic ports.				
1904.						
September	7	140		7	125	
October	6	146	1	3	154	122
November	6	128	1	5	129	61
December	6	105		11	97	
1905.						
January	4	107	1	4	99	20
February	6	111		4	113	
March	9	157		4	163	
April	12	150			141	
May	4	181		2	81	
June	7	119		2	7	
July	9	80		3	10	
August	7	92			6	
Total	83	1,516	3	45	1,115	213

Month.	Crew inspected.	Passengers inspected.		Persons held in quarantine	Persons bathed and effects disinfected.	Crew and passengers vaccinated
		Cabin.	Steerage.			
1904.						
September	3,202	243	1,232	117		248
October	3,664	299	1,621	44	44	464
November	2,737	231	1,310	20	20	138
December	2,479	228	1,403			217
1905.						
January	2,523	170	1,088	6	7	432
February	2,554	138	820			595
March	3,302	297	1,461			645
April	3,166	314	1,292			620
May	3,417	260	1,081			272
June	2,603	263	959			432
July	2,399	243	706			261
August	2,387	179	1,103			9
Total	34,333	2,865	14,076	187	71	4,373

Summary of quarantine transactions at Iloilo, P. I., during the year ended August 31, 1905.

	Number.		Number.
Vessels inspected	1,599	Cases of quarantinable diseases detected among persons in quarantine	0
Vessels detained in quarantine	3	Persons detained in quarantine	187
Vessels disinfected	5	Crew inspected	34,333
Vessels fumigated to kill vermin	38	Passengers inspected	16,941
Bills of health issued	1,115	Persons vaccinated	4,373
Pieces of baggage disinfected	213	Persons bathed and effects disinfected	71
Pieces of baggage inspected and passed	0		
Cases of quarantinable diseases detected on vessels:			
Smallpox	3		
Leprosy	2		

Report of inspection of aliens at Port of Iloilo, P. I., during the year ended August 31, 1905.

Month.	Inspected.	Certified.	Deported.	Cause of deportation.
1904.				
September	19	0	0	1 trachoma.
October	45	10	5	5 trachoma.
November	20	11	0	
December	48	6	0	
1905.				
January	17	1	1	Leprosy.
February	6	2	0	
March	38	2	0	
April	34	4	0	
May	26	2	0	
June	59	1	0	
July	23	0	0	
August	10	0	0	
Total	345	39	6	

UNITED STATES TREASURY DEPARTMENT,
PUBLIC HEALTH AND MARINE-HOSPITAL SERVICE,
OFFICE OF THE UNITED STATES QUARANTINE OFFICER,
Cebú, P. I., July 1, 1905.

SIR: I have the honor to make the following report on the transactions of this station for the year ended June 30, 1905:

From the standpoint of the maritime quarantine officer the year has been rather an uneventful one; very little sickness has been treated in quarantine and no quarantinable diseases have been brought in from a foreign port.

CHOLERA.

This disease is a thing of the past, and it would seem that by enforcing the present regulations concerning the importation of green vegetables and attention to the water supply of a vessel from a cholera-infected port, the danger of the disease being introduced into these islands again is very remote.

In the island of Cebú and nearby places, rumors of cholera have come from time to time, but, upon investigation, they have always proved false, the real condition being a ptomaine poisoning. When it is considered that the natives eat a great deal of fish, which is quite frequently in a more or less advanced stage of decomposition, it is not surprising that one should meet occasionally with fatal cases of ptomaine poisoning.

PLAGUE.

But one case of plague was found on a vessel. This was in the person of a Moro on a small schooner from Joló, P. I. This schooner had been in Cebú Harbor one week, and, as the crew had been ashore, the infection was undoubtedly contracted in this port. It was of the pneumonic variety and the patient succumbed in a few days. When first seen he had a temperature of 39° C., dyspnœa, physical signs of pneumonia, and great prostration.

Occasional cases of plague are being reported from Cebú. It is simply a continuation of the infection which was introduced here some years ago, and has never been stamped out. This subject was taken up more fully in the report for the year ended June 30, 1904.

This year there has been a noticeable increased mortality among rats. This was first brought to my notice when rats commenced to die in three houses immediately adjoining each other. It was thought at first as the mortality seemed to be limited to this small area that the rats had been poisoned, but about thirty days afterwards a case of plague was removed from one of these houses, and since then the increased mortality among rats has been more widespread.

We are at present in as good a position to have an epidemic of plague in the city as we ever have been. The infection is well scattered, and the city, with its houses and people, is in a very insanitary state. But it is doubtful whether it is possible for this country to have bad epidemics of plague such as are experienced in India and China. It is a tropical country where houses are never closed and are built elevated from the ground, mainly of nipa and bamboo (frame, roof, walls, and floors), and ventilation is therefore very good. Overcrowding and filth are, so to speak, neutralized by the free access of air.

The local authorities have been helpless so far, in that they have had no funds with which to work; but recently the city appropriated ₱2,000, which will be used by the provincial officer of health to try and stamp out the infection by destroying rats and a general cleaning up of the city.

There have been altogether this year 20 cases of plague, with 19 deaths, in Cebú, or, including the case on the schooner in the bay, 21 cases and 20 deaths.

SMALLPOX.

In the month of November, 1904, a coast guard cutter arrived from Cagayán, Mindanao, P. I., with 8 smallpox patients aboard. Three of these were convalescent, while 5 were still in the scabbing stage, 3 having some fever. This is the only vessel that we have had this year with smallpox, and this would never have occurred if the patients had not been sent away from the hospital in which they were treated long before they were ready to be discharged. The vessel, crew, and passengers were treated in the usual way.

It is pleasing to note that smallpox is steadily decreasing in the province, thanks to the efficiency of vaccination as practiced by the vaccinators of the insular board of health.

In the city of Cebú there have been but 4 cases of smallpox reported during the entire year.

GENERAL HEALTH CONDITIONS IN CEBÚ.

This city, notwithstanding the fact that there is no sewage system and no water supply except for numbers of superficial wells, is a very healthy one. It has its share of beriberi, skin diseases, diseases of the gastro-intestinal system, nervous system, etc., and it may be said more than its allowance of venereal diseases. Dysentery, not of the amœbic variety, is present, but the amœbic variety of the disease, except for imported cases, is rare.

Malarial fevers are not as prevalent as in some other parts of the province. In fact, the Anopheles mosquito is not common. The varieties Culex and Stegomyia are in great abundance. I believe that if all the superficial wells in the city were kept covered and the few open drains done away with the number of mosquitoes in the city of Cebú would decrease 75 per cent.

VACCINATIONS.

During the year there have been 3,242 vaccinations made upon sailors, mostly sailors of the small craft known as "bancas" or "paraos." Of these there is only a record of 77 "takes." This is not because of poor vaccine, but because of frequent changes in the crews of these small vessels, which, of course, prevents one from seeing many of them a second time. The good results obtained by the board of health vaccinators is readily seen when it is stated that they get from 50 per cent to 75 per cent "takes," and, as we use the same vaccine, it may be assumed that we get the same results.

In this connection I wish to extend my thanks to Dr. Arlington Pond, of the insular board of health, who kindly detailed one of his vaccinators to vaccinate sailors entering this port.

FUMIGATION.

The fumigation of the small vessels registered in this port has been practiced twice during the year, there having been 32 vessels fumigated to kill vermin, or, including the quarantine launch *Sanidad* and the disinfecting barge *Protección*, 34 vessels were fumigated. This figure also includes the fumigation of a few larger vessels from plague-infected ports, or bound to the United States.

It is very rarely possible to fumigate vessels that arrive here from Hongkong or Singapore, as it is usually their first port of call, and they always have much cargo for Iloílo and Manila, and the fumigation of a vessel with cargo is very unsatisfactory, in fact, useless.

It may be noted that while the first fumigation of vessels hailing from this port show, in most cases, many rats, mice, roaches, etc., subsequent fumigations disclose the presence of very few or none of these vermin.

DISINFECTION.

During the year there have been 4 vessels disinfected (in whole or in part) for disease, as follows: One for smallpox, 1 for plague, and 2 for leprosy. The first 2 were held 14 days and 7 days, respectively, after disinfection, but no further cases developed. The vessels which had leprosy were not detained, the cases being taken off and the staterooms disinfected.

AUTOPSIES.

But one autopsy was held during the year, and that on the case of plague which died on a schooner in the bay and which has already been mentioned. The autopsy was performed by Asst. Surg. J. D. Long, who was in temporary charge during the absence in Manila of the regular quarantine officer.

The autopsy findings were as follows:

"The peculiar post-mortem lividity seen in persons dead of plague was marked. The cavities were full of serum, and the lower lobe of the right lung was much congested, and there were spots of consolidation throughout the substance. Small hemorrhages were plentiful in the pericardium, the pleura, and the peritoneal covering of the liver. The liver and spleen were much enlarged and congested, as were the lymphatic glands."

GENERAL CONSIDERATIONS.

The title to Cauit having been decided by the court of land registration in favor of the government, the claimants expressed their determination to appeal the case to the next higher court, the court of first instance, and in the event of losing in that court, to appeal the case to the supreme court. Now, as this would have meant a long wait and great waste of time, it was deemed advisable to compromise, if possible, with the claimants, in order to get them to withdraw the case from the courts and give the government a clear title.

Assistant Surgeon Long, with the fiscal for the Province of Cebú, had charge of the matter, and they succeeded in effecting a compromise for ₱816. This amount of money reimbursed the claimants for the cocoanut trees that they had planted on the island. There were 241 trees all told, 167 bearing fruit and 74 small ones. The settlement was made on a basis of ₱4 for each of the large trees and ₱2 for each of the small ones.

Since that time, the contract for building the quarantine station was given to the California-Manila Lumber Commercial Company, for ₱41,276.85. This includes the construction of the buildings. wharf, plumbing, cesspool and sewer, water tank, and windmill. The work is now well underway, and should be finished in the course of one or two months.

While it is the intention to drill an artesian well on Cauit Island, it is certain that the station will be completed before the well is even started, and in that event it will be necessary to get water for the station use from one of the water-boat companies.

CIRCULAR LETTERS AND INSPECTIONS.

During the year there have been two circular letters modifying quarantine sent out from this office. Copies are inclosed.

Except for the slight modification of quarantine applying in this port (letter of April 1, 1905), the exemption of vessels from the necessity of securing bills of health (letter of April 26, 1905), and the exemption of army transports carrying medical officers from undergoing quarantine inspection, it will be seen that the same regulations are in force in regard to the inspection of interisland vessels as were instituted in cholera times. Now, inasmuch as cholera is unknown in the islands at the present time, and that there is no disease present in epidemic form, it seems to me in this port, at least, a great hardship on these small local vessels to make them undergo practically the same inspection as was required when there was a severe epidemic of cholera throughout the Philippine Islands; and I would respectfully recommend that all vessels plying between ports in the Philippine Islands be exempt from quarantine inspection, unless such vessels have sickness aboard at the time of entering port or during the voyage. An occasional inspection of the vessels, either at the time of arrival or some time during their stay in port, would enable one to keep informed as to their sanitary state, and this, with an occasional fumigation to destroy vermin, would in this port, at least, be all that is necessary. I would also respectfully suggest that the proper clause providing for fines in the event of a vessel entering with sickness and not awaiting inspection, or not keeping in good sanitary condition, be inserted in the harbor regulations of the port.

During the year there have been 16 vessels cleared for ports in the United States. These vessels, with their crews and cargo manifests, have been inspected aboard just prior to departure. Bills of health are issued to the vessels after this inspection has taken place. Where the vessel has not already been fumigated in her first port, fumigation is done here. Usually, this being her second port in the Philippines, fumigation has already been done.

EXAMINATION OF APPLICANTS FOR MASTER'S AND ENGINEER'S LICENSES.

During the last year we have been examining applicants for licenses as ship's officers. The arrangement was made so that applicants having been given the privilege of holding their written examinations here could also receive the physical. Otherwise they would

have to go to Manila in order to undergo that examination. Certificates issued by this office are not valid until they have been approved by the chief quarantine officer.

There have been made this year 67 such examinations, and physical defects found and so certified as follows:

Tuberculosis of lung	1
Valvular disease of the heart:	
Mitral stenosis	3
Mitral regurgitation	4
Aortic stenosis	5
Aortic regurgitation	1
Varicose veins of leg	1
Limited movement of joint, elbow	1
Opacity of crystaline lens	1
Opacity of cornea	1
Gonorrhea	1
Defective vision due to errors of refraction:	
One eye	6
Both eyes	11
Trachoma	2

Respectfully,

CARROLL FOX,
Passed Assistant Surgeon.

The CHIEF QUARANTINE OFFICER FOR THE PHILIPPINE ISLANDS.

[Inclosure.—Circular letter.]

UNITED STATES PUBLIC HEALTH AND MARINE-HOSPITAL SERVICE,
OFFICE OF THE UNITED STATES QUARANTINE OFFICER,
Cebú, P. I., April 1, 1905.

To steamship companies, owners and agents of vessels, and others:

SIRS: You are hereby informed that hereafter all vessels plying between the port of Cebú and other ports on the island of Cebú will not be required to obtain a bill of health and will not be required to await quarantine inspection upon entering this port: *Provided*, That when such vessel arrives with sickness aboard, or has had sickness aboard during the voyage, she will fly the yellow flag and await quarantine inspection as in the past.

Also, when a vessel leaves this port one day and returns the next immediately following, she will not be required to obtain a bill of health or await quarantine inspection. If, however, such vessel arrives with sickness aboard, she will be subject to inspection as heretofore.

By direction of the chief quarantine officer for the Philippine Islands.

Respectfully,

CARROLL FOX,
Passed Assistant Surgeon,
Quarantine Officer for the Port of Cebú.

[Inclosure.—Circular letter.]

UNITED STATES PUBLIC HEALTH AND MARINE-HOSPITAL SERVICE,
OFFICE OF THE UNITED STATES QUARANTINE OFFICER,
Cebú, P. I., April 26, 1905.

To the owners, agents, and masters of vessels, and others concerned:

SIRS: After May 15, 1905, it will not be necessary for masters of vessels commencing a voyage from one port in the Philippines Islands to another port in the Philippine Islands to obtain the bill of health issued by the officers of this service which heretofore has been required.

By direction of the chief quarantine officer for the Philippine Islands.

Respectfully,

CARROLL FOX,
Passed Assistant Surgeon,
Quarantine Officer for the Port of Cebú.

Statistics of quarantine transactions at the port of Cebú, P. I., for the year ended August 31, 1905.

INCOMING.

Month.	Vessels inspected from—		Vessels in quarantine.	Vessels disinfected.	Bills of health issued.	Pieces of baggage disinfected.
	Foreign ports.	Domestic ports.				
1904.						
September	10	351	.....	5	157	.....
October	7	350	.....	.....	162	.....
November	7	329	1	1	105	139
December	9	340	.....	1	127	.....
1905.						
January	6	441	.....	9	139	.....
February	8	414	.....	5	111	.....
March	7	614	.....	2	156	.....
April	13	382	.....	.....	144	.....
May	10	377	.....	.....	84	.....
June	8	344	.....	.....	9	.....
July	6	264	.....	2	9	.....
August	9	160	.....	3	8	.....
Total	100	4,366	1	28	1,211	139

Month.	Inspected.	Passengers inspected.		Persons held in quarantine.	Persons bathed and effects disinfected.	Crew and passengers vaccinated.
		Cabin.	Steerage.			
1904.						
September	5,636	262	1,745	.....	.....	.....
October	5,584	7	350	.....	.....	124
November	4,539	248	1,655	55	47	182
December	4,791	214	1,783	.....	.....	313
1905.						
January	5,613	201	2,450	.....	.....	.....
February	5,262	159	1,703	.....	.....	.....
March	7,443	263	2,260	.....	.....	.....
April	6,160	247	1,534	.....	.....	314
May	6,023	218	1,235	.....	.....	1,336
June	5,772	225	1,704	.....	.....	752
July	5,137	200	1,181	.....	.....	775
August	4,079	129	979	.....	.....	218
Total	66,039	2,373	18,579	55	47	4,014

Summary of quarantine transactions at Cebú, P. I., during the year ended August 31, 1905.

	Number.		Number.
Vessels inspected	4,466	Cases of quarantinable diseases detected among persons in quarantine	0
Vessels detained in quarantine	1	Persons detained in quarantine	55
Vessels disinfected	3	Crew inspected	66,039
Vessels fumigated to kill vermin	25	Passengers inspected	20,952
Bills of health issued	1,211	Persons vaccinated	4,014
Pieces of baggage disinfected	139	Persons bathed and effects disinfected	47
Pieces of baggage inspected and passed	0		
Cases of quarantinable diseases detected on vessels:			
Smallpox	8		
Plague	1		
Leprosy	1		

Report of inspection of aliens at port of Cebú, P. I., during the year ended August 31, 1905.

Month.	Inspected.	Certified.	Deported.	Cause of deportation.
1904.				
September	3	0	0	
October	4	0	0	
November	0	0	0	
December	1	0	0	
1905.				
January	3	1	1	1 trachoma.
February	3	0	0	
March	3	0	0	
April	14	0	0	
May	9	0	0	
June	8	0	0	
July	6	0	0	
August	2	0	0	
Total	56	1	1	

ZAMBOANGA, PHILIPPINE ISLANDS.

The quarantine inspection of vessels at the port of Zamboango was taken more directly under Service control on the 1st of September, 1904. Prior to that date the medical officers of the United States Army on duty at that port acted as quarantine officers without any compensation for the additional work.

The station was under the command of Acting Asst. Surg. Robert U. Patterson during the months of September to December, 1904, but during his temporary absence in the months of November and December, Asst. Surg. Jesse R. Harris, U. S. Army, inspected such vessels as entered from foreign ports. On January 1, 1905, Acting Asst. Surg. M. A. W. Shockley assumed command of the Service and remained in command at the close of the fiscal year.

During the year 22 vessels arrived at this port directly from foreign ports. No quarantinable diseases were detected upon inspection. No disinfection or fumigation was done to foreign vessels. One domestic vessel was held to determine the cause of deaths aboard and disinfected and remanded to the Mariveles quarantine station for further treatment.

The expenditures for the operation of the station at Zamboanga during the fiscal year were ₱340.

Statistics of quarantine transactions at the port of Zamboanga, P. I., for the year ended August 31, 1905.

INCOMING.

Month.	Vessels inspected from—		Crew inspected.	Passengers inspected.	
	Foreign ports.	Domestic ports.		Cabin.	Steerage.
1904.					
September					
October	2		120	3	125
November	1		60	18	
December	1		64	10	
1905.					
January	2	1	106	3	
February	1	1	51		
March	3		125	3	4
April	4		4	14	157
May	1		47	28	81
June	2		134	22	76
July	2		136	16	64
August	3		157	49	35
Total	22	2	1,004	166	542

Summary of quarantine transactions at Zamboanga, P. I., during the year ended August 31, 1905.

	Number.		Number.
Vessels inspected	24	Cases of quarantinable diseases detected among persons in quarantine	0
Vessels detained in quarantine	0	Persons detained in quarantine	0
Vessels disinfected	0	Crew inspected	1,004
Vessels fumigated to kill vermin	0	Passengers inspected	708
Bills of health issued	24	Persons vaccinated	0
Pieces of baggage disinfected	0	Persons bathed and effects disinfected	0
Pieces of baggage inspected and passed	0		
Cases of quarantinable diseases detected on vessels	0		

Report of inspection of aliens at port of Zamboanga, P. I., during the year ended August 31, 1905.

Month.	Inspected.	Certified.	Deported.	Month.	Inspected.	Certified.	Deported.
1904.				1905.			
September	0	0	0	March	7	0	0
October	10	0	0	April	3	0	0
November	17	0	0	May	5	0	0
December	4	0	0	June	0	0	0
				July	7	0	0
1905.				August	0	0	0
January	0	0	0				
February	4	0	0	Total	57	0	0

JOLÓ, ISLAND OF JOLÓ, PHILIPPINE ISLANDS.

The station at Joló was under the command of Passed Asst. Surg. M. K. Gwyn from the beginning of the fiscal year until August 1, 1904, when he was relieved from duty at that port by Acting Asst. Surg. W. F. Lewis, who has had charge of the station during the remainder of the year.

The Service maintains at Joló only an inspection station. Up to August 1, 1904, all vessels which arrived at the port of Joló were required to await quarantine inspection and secure pratique before entering. After the date mentioned, only those vessels which arrived directly from foreign ports were required to undergo quarantine inspection. During the year 13 vessels arrived from foreign ports and were inspected and granted pratique. No quarantinable diseases were detected upon arriving vessels, and for this reason no disinfection work was done or persons or vessels detained in quarantine. No vessels were remanded to the other stations of the Service for either disinfection or fumigation.

The sanitary situation in the city and island of Joló has not materially changed during the year. Joló has also shared in the improved conditions in the islands respecting quarantinable diseases.

From a commercial standpoint Joló has shown a tendency toward an increase in the number of foreign vessels making Joló a port of call. An endeavor to operate a line of steamers from Hongkong via Zamboanga and Joló to north Borneo ports is now being made. This increase of traffic will naturally bring Joló in closer touch with the centers of the Orient where quarantinable diseases are almost constantly present, will increase the liability of infected vessels arriving at this port and also from a quarantine view point will constitute an added menace to the public health of the islands.

During the year cholera was reported to be epidemic in portions of Borneo, but, fortunately, although the disease was said to be severe at places, it did not seem to spread with the usual rapidity with which cholera travels. No cases were reported at any of the Borneo ports from which vessels which arrived at Joló had departed.

The entire expense of operating this station during the fiscal year, including salaries, fees to acting assistant surgeon, transportation, etc., was ₱661.06.

During the coming year the fees paid the quarantine officer and the purchase of blanks and stationery will be all the expenses the Service will have at this port. Transportation to and from the arriving foreign vessels will be secured by the officer in charge without expense to the Service.

The work of the Service was conducted very satisfactorily during the year.

Statistics of quarantine transactions at the port of Joló, P. I., for the year ended August 31, 1905.

INCOMING.

Month.	Vessels inspected from foreign ports.	Crew inspected.	Passengers inspected.	
			Cabin.	Steerage.
1904.				
September	1	60	.....	41
October	1	59	.....	.....
November	1	60	41	.....
December	1	64	1	21
1905.				
January	.....	.....	.....	.....
February	1	65	2	28
March	.....	.....	.....	.....
April	3	207	16	39
May	2	116	5	27
June	3	160	12	28
July	.....	.....	.....	.....
August	.....	.....	.....	.....
Total	13	791	77	184

Summary of quarantine transactions at Joló, P. I., during the year ended August 31, 1905.

	Number.		Number.
Vessels inspected	13	Cases of quarantinable diseases detected among persons in quarantine	0
Vessels detained in quarantine	0	Persons detained in quarantine	0
Vessels disinfected	0	Crew inspected	791
Vessels fumigated to kill vermin	0	Passengers inspected	261
Bills of health issued	13	Persons vaccinated	0
Pieces of baggage disinfected	0	Persons bathed and effects disinfected	0
Pieces of baggage inspected and passed	0		
Cases of quarantinable diseases detected on vessels	0		

Report of inspection of aliens at port of Joló, P. I., during the year ended August 31, 1905.

Month.	Inspected.	Certified.	Deported.	Month.	Inspected.	Certified.	Deported.
1904.				1905.			
September	29	0	0	March	0	0	0
October	0	0	0	April	18	0	0
November	26	0	0	May	21	0	0
December	11	0	0	June	24	0	0
1905.				July	0	0	0
January	0	0	0	August	0	0	0
February	24	0	0	Total	153	0	0

Grand summary of the quarantine transactions in the Philippine Islands during the year ended August 31, 1905.

	Number.		Number.
Vessels inspected	9,632	Cases of quarantinable diseases detected on vessels—continued.	
Vessels detained in quarantine	63	Plague	1
Vessels disinfected	96	Leprosy	28
Vessels fumigated to kill vermin	247	Cases of quarantinable diseases detected among persons in quarantine	7
Bills of health issued	5,202	Persons detained in quarantine	5,049
Pieces of baggage disinfected	51,743	Crew inspected	229,969
Pieces of baggage inspected and passed	25,210	Passengers inspectd	139,992
Cases of quarantinable diseases detected on vessels:		Persons vaccinated	21,743
Smallpox	28	Persons bathed and effects disinfected	23,511
Cholera suspects	1		

FINANCIAL STATEMENT—RECEIPTS AND EXPENDITURES—QUARANTINE SERVICE IN THE PHILIPPINE ISLANDS.

[Philippine currency.]

A.—General appropriation account, Act No. 1225, year ended August 31, 1905.

CREDITS.

Balance of appropriation, Act No. 1225, available September 1, 1904	₱145,655.00
Refunds to expenditures for subsistence	1,193.00
Total	146,848.00

DEBITS.

Disbursements by disbursing officer	₱93,255.40
Amount credited insular purchasing agent	24,391.83
Cash balance on hand	321.45
Amount unwithdrawn from treasury	28,879.32
Total	146,848.00

B.—General appropriation account, fiscal year 1904.

CREDITS.

Balance of appropriation, available September 1, 1904	₱28,056.29

DEBITS.

Amount disbursed by J. G. Jester, Washington	₱2,819.64
Amount disbursed by disbursing officer	1,506.41
Amount credited insular purchasing agent	3,046.98
Amount unwithdrawn from treasury	20,683.26
Total	28,056.29

C.—Special appropriation, Act No. 831.

CREDITS.

Appropriation for launch for Manila Bay	₱8,000.00

DEBITS.

Disbursements by disbursing officer	₱7,975.00
Balance unwithdrawn from treasury	25.00
Total	8,000.00

D.—Deficiency appropriation, Acts Nos. 1188 and 1248.

CREDITS.

Appropriation for launch repairs and supplies, available until used	₱10,000.00

DEBITS.

Disbursements by disbursing officer	₱3,934.58
Cash balance on hand	1,065.42
Balance unwithdrawn from treasury	5,000.00
Total	10,000.00

E.—Appropriation, Act No. 1342.

CREDITS.

Cebú quarantine station	₱18,723.15

DEBITS.

Disbursements by disbursing officer	₱557.78
Cash balance on hand	942.22
Balance unwithdrawn from treasury	17,223.15
Total	18,723.15

F.—Appropriation for fiscal year 1906, Act No. 1358.

CREDITS.

Expenses for July and August	₱16,522.06
Refund to expenditures for subsistence	93.00
Total	16,615.06

DEBITS.

Amount credited insular purchasing agent	₱522.06
Disbursements by disbursing officer	11,250.70
Cash balance on hand	4,842.30
Total	16,615.06

I.—*Statement of funds to be accounted for by expenditures during the period from September 1, 1904, to August 31, 1905.*

Disburesments by J. G. Jester, funds, fiscal year 1904	₱2,819.64
Disbursements by N. C. Comfort, funds, fiscal year 1904	3,046.98
Credited insular purchasing agent, funds, fiscal year 1904	1,506.41
Disbursements by N. C. Comfort, funds, Act No. 831	7,975.00
Disbursements by N. C. Comfort, funds, Act No. 1188	3,934.58
Disbursements by N. C. Comfort, funds, Act No. 1342	557.78
Disbursements by N. C. Comfort, funds, fiscal year 1905	93,255.40
Credited insular purchasing agent, funds, fiscal year 1905	24,391.83
Disbursements by N. C. Comfort, funds, fiscal year 1906	11,250.70
Credited insular purchasing agent, funds, fiscal year 1906	522.06
Total expenditures	149,260.38

II.—*Expenditures.*

September, 1904:		
Compensation of personnel	₱8,535.17	
Office and general service expenses, services	681.90	
Launch and barge expenses, supplies and repairs	1,735.31	
Station supplies and disinfectants	1,615.77	
New construction and new equipment	268.40	
		₱12,836.55
October, 1904:		
Compensation of personnel	13,719.88	
Office and general service expenses, services	721.94	
Launch and barge expenses, supplies and repairs	823.54	
Station supplies and disinfectants	945.61	
Repairs to buildings and wharves	271.99	
New construction and new equipment	841.60	
		17,324.56
November, 1904:		
Compensation of personnel	7,025.70	
Office and general service expenses, services	271.80	
Launch and barge expenses, supplies and repairs	982.23	
Station supplies and disinfectants	1,035.42	
New construction and new equipment	24.48	
		9,339.63

December, 1904:		
Compensation of personnel	₱9,841.63	
Office and general service expenses, services	230.00	
Launch and barge expenses, supplies and repairs	5,202 50	
Station supplies and disinfectants	517.42	
New construction and new equipment	2,800 40	
		₱18,591.95
January, 1905.		
Launch and barge expenses, supplies and repairs	273.24	
Station supplies and disinfectants	709.09	
New construction and new equipment	35.20	
		1,017.53
February, 1905:		
Compensation of personnel	14,363.39	
Office and general service expenses, services	804.11	
Launch and barge expenses, supplies and repairs	1,113.39	
Station supplies and disinfectants	1,577.68	
Repairs to buildings and wharves	409.77	
New construction and new equipment	276.68	
		18,545.02
March, 1905.		
Compensation of personnel	1,186.68	
Office and general service expenses, services	157.70	
Launch and barge expenses, supplies and repairs	365.57	
Station supplies and disinfectants	1,764.32	
Repairs to buildings and wharves	111.10	
New construction and new equipment	110.00	
		3,695.37
April, 1905:		
Compensation of personnel	11,797.70	
Office and general service expenses, services	280.00	
Launch and barge expenses, supplies and repairs	1,498.52	
Station supplies and disinfectants	1,146.72	
Repairs to buildings and wharves	185.51	
New construction and new equipment	387.70	
		15,296.15
May, 1905:		
Compensation of personnel	5,866.02	
Office and general service expenses, services	217.13	
Launch and barge expenses, supplies and repairs	1,858.28	
Station supplies and disinfectants	3,345.82	
Repairs to buildings and wharves	320.63	
New construction and new equipment	8,300.04	
		19,907.92
June, 1905:		
Compensation of personnel	6,588.36	
Office and general service expenses, services	320.58	
Launch and barge expenses, supplies and repairs	3,543.70	
Station supplies and disinfectants	1,195.00	
New construction and new equipment	238.27	
		11,885.91
July, 1905.		
Compensation of personnel	5,378.69	
Office and general service expenses, services	216.10	
Launch and barge expenses, supplies and repairs	510.63	
Station supplies and disinfectants	618.26	
Repairs to buildings and wharves	5,451.54	
New construction and new equipment	490.52	
		12,665.74
August, 1905.		
Compensation of personnel	6,777.52	
Office and general service expenses, services	81.32	
Launch and barge expenses, supplies and repairs	719.41	
Station supplies and disinfectants	112.02	
New construction and new equipment	463.78	
		8,154.05
Total expenditures		149,260.38

III.—*Total expenditures for the quarantine service in the Philippine Islands, September 1, 1904, to August 31, 1905.*

DETAILS.	
Compensation of personnel	₱91,080.74
Office and general service expenses, services	3,982.58
Launch and barge expenses, supplies and repairs	18,626.32
Purchase of launch for Manila Bay	7,975.00
Station supplies and disinfectants	14,583.13
Repairs to buildings and wharves	6,750.54
New construction and new equipment	6,262.07
Total expenditures	149,260.38

IV.—*Expenditures by station.*

Manila:		
General service expenses	₱46,092.07	
Launch expenses	12,325.50	
New station equipment	10,928.92	
		₱69,346.49
Mariveles:		
General service expenses and supplies	34,972.16	
Repairs to buildings and wharves	6,929.30	
New construction and equipment	2,123.85	
		44,025.31
Iloílo:		
General service expenses	5,529.93	
Launch and barge expenses	8,176.41	
New station equipment	403.82	
		14,110.16
Cebú:		
General service expenses	9,841.98	
Launch and barge expenses	10,115.16	
New construction and station equipment	820.22	
		20,777.36
Joló:		
General service expenses	616.66	
Boat expenses	40.00	
New station equipment	4.40	
		661.06
Zamboanga:		
General service expenses	340.00	
Boat expenses		
New station equipment		
		340.00
Total expenditures		149,260.38

V.—*Statement of fiscal year 1905 funds—General appropriations and expenditures for the quarantine service in the Philippine Islands from September 1, 1904, to August 31, 1905.*

FISCAL YEAR 1905.

Appropriation Act No. 1225.	Amount of appropriation available.	Expenditures.
Salaries and wages	₱86,125.98	₱80,304.53
Support of Mariveles quarantine station	34,000.00	20,781.15
Contingent expenses	25,529.02	16,561.35
Total	145,655.00	117,647.03

Unexpended balance, August 31, 1905	₱28,007.97
Refunds to expenditures	1,193.00
Total	29,200.97
Total appropriations available	145,655.00
Total expenditures to August 31, 1905	117,647.03
Retained against provisions of Act No. 1361	14,000.00

VI.—*Statement of fiscal year 1906 funds—General appropriation fund and expenditures for the quarantine service in the Philippine Islands during the year ended August 31, 1905.*

Appropriation Act No. 1358.	Amount of appropriation available.	Expenditures.
Salaries and wages	₱14,000.00	₱10,776.21
Support of Mariveles quarantine station	1,093.00	267.86
Contingent expenses	1,552.06	758.69
Total	16,645.06	11,802.76

Cash balance on hand	₱4,842.30
Total appropriation available	16,645.06
Expended to August 31, 1905	11,802.76

Respectfully submitted.

VICTOR G. HEISER,
Passed Assistant Surgeon, Chief Quarantine Officer for the Philippine Islands.

The SECRETARY OF THE INTERIOR, *Manila, P. I.*

APPENDIX F.

ANNUAL REPORT PHILIPPINE CIVIL HOSPITAL.

PHILIPPINE CIVIL HOSPITAL,
Manila, P. I., September 1, 1905.

SIR: I have the honor to transmit herewith my annual report of the work performed by this bureau during the past year.

There has been but little change in the character and results of the work of this bureau.

The moving of the attendants into the building in the immediate rear of the hospital allowed the conversion of their old quarters into quite a respectable maternity pavilion, which was urgently necessitated by the fact that we were compelled to care for all females in one small building, where the crying of babies and the noises associated with confinement cases (which usually occur at night), made problematical the progress of operative and serious medical cases in the same building. The former attendants' quarters, as remodeled, lends itself surprisingly well to the care of maternity cases. There is in it room for twelve patients, besides two private rooms, a room for the babies, and a confinement room. The latter, as its name indicates, is used for this purpose alone, and while quite small, is practicable. The lights are so arranged about the walls as to give thorough illumination. The equipment is simple, and while not complete, suffices. This building has been a great comfort to the mothers and it has been patronized by all classes. There were 77 women delivered here this year.

As regards dysentery: There were treated in all 253 cases, of which 222 were whites, 28 natives, and 3 Japanese. Two hundred and fourteen of these cases were amœbic. There was but one death from dysentery during the year, or a percentage of four-tenths of 1 per cent, and this case was in a hopeless condition when presented.

Of the diseases recorded, malaria appears to have been the most fatal, all such cases being of the pernicious form and most of them were brought into hospital in a comatose state.

The surgery during the past year has been more insistent, and although it was necessary to change operating nurses, the results have been universally good.

The nurses of this institution have continued the high standard of the work during the year, and have been most faithful and attentive in the performance of their duties. The attendants on duty at this time are undoubtedly the most efficient in the history of the civil hospital, and although their work has been trying and insistent there has been no complaint.

During the year there has been handled an immense correspondence from civil employees all over the archipelago desiring medicines and "long-distance treatment." We have prepared small packages of common remedies with directions inclosed as to their contents and uses. These packages have been issued to all requesting the same, but requests for dangerous remedies, and some for quantities sufficient to stock a small drug store, we have been compelled to refuse. Many Government employees write long letters requesting treatment for conditions that, when summarized, give no definite idea as to what their disease might be, and have necessarily been disappointed in not receiving treatment. Some confusion likewise has arisen, usually among members of the educational bureau, who apparently have the impression that the civil government will furnish them medicines, through this bureau, for issue to the natives of their district, and if one-half of these requests had been honored there would not have been sufficient funds in the annual appropriation to pay for the same.

About April 1, 1905, the bureau of agriculture commenced furnishing the civil hospital with fresh milk from cows received from the United States. This was a boon to the sick treated by this bureau, and to this milk is undoubtedly due the saving of the lives of very many ill adults and more babies. Unfortunately, many of these cows died and there was hardly enough milk left to continue the furnishing of a regular amount. The canned milk of the market, and the Australian milk brought in bulk, has been of such an uncertain quality that this fresh milk almost solved the trying question of liquid diets, which has been one of the most difficult to contend with. The gradual diminution of the amount of milk received has compelled us to depend upon the canned article to supply the balance necessary, and suggests either the importation of more cows, or the study of goats' milk as a possible substitute.

I respectfully call to your attention the fact that we have operated upon 75 cases of appendicitis with no deaths, and 27 cases of liver abscess with but 2 deaths. One of the

latter cases was almost dead when presented, and the other had both lobes of the liver studded with hundreds of abscesses of all sizes. This number of deaths in operations for abscess of the liver, being less than 8 per cent, is remarkably low. It is my opinion that the great majority of the cases of appendicitis in this climate, as well as recurrence in the disease of amœbic dysentery, is due to the presence of the amœbæ dysenteræ in the appendix, and that many of the other cases of appendicitis, where the amœbæ is not found in the appendix, are due to the indirect influence of the conditions produced by their presence in its immediate vicinity. It is practically impossible to force the quinine solution into the appendix by the usual methods used. Examination of appendices, after operation, has shown the amœbæ present in more than half the cases. In two cases the amœbæ were found in the appendix when they were not in the stools produced by magnesium sulphate just prior to operation.

During the past year I have endeavored to ascertain whether a prophylaxis, as regards drinking water infected with amœbæ, was a possibility. The hopes that a strong current of electricity through the city water main might suffice to kill the amœbæ, (which, if true, would prove a boon to all householders of Manila) led me to make what experiments my limited equipment allowed. I had but the Kinraid coil, 110 volts, alternating current, which current was allowed to pass through water, in which it had been previously demonstrated there existed living amœbæ, for five minutes, but upon examination afterwards they were found still living. It might prove possible, however, with a powerful Tesla coil, to kill the amœbæ in running water, and the end might justify the experiment.

The further experiment as to a possible prophylaxis of garden vegetables, fruit, etc., which have been demonstrated by the government laboratories "to carry amœbæ" was attempted. With thoroughly dried earth and distilled water, I prepared a box on an elevation 20 feet from the ground and planted American lettuce seed from the original package. These were watered with distilled, nonamœbic water, and in due season the growing lettuce was examined and found to contain many living amœbæ. At my request the government laboratories carefully tested the effect of ordinary vinegar taken from the stores of the hospital upon the amœbæ on lettuce, and determined that it killed the amœbæ in less than one-half a minute. Further investigations ascertaining the "degree of concentration of acidulation" of water necessary to kill amœbæ, is, I believe, being pursued by the government laboratories.

During the past year, the position of attending physician and surgeon, civil sanitarium, Baguio, becoming vacant, Dr. William J. Mallory, house surgeon of this bureau, was appointed to that place, and from his splendid work while serving here I have every reason to believe his administration will prove most satisfactory.

During the absence of the attending physician and surgeon, civil officers and employees, for one month owing to illness, that position was ably filled by Dr. William P. Read of the board of health.

Total number of patients admitted for treatment, 1,641; of these, there were 1,197 Americans and Europeans (Anglo-Saxons), and 28 Chinese, Japanese, and East Indians, etc. There were 1,337 male patients and 304 females, which may be further classed as 1,150 pay and 491 free patients, i. e., "emergency" cases and civil employees whose salaries do not exceed $40 United States currency per month. There were 1,457 of these patients treated by the civil hospital staff and 184 by outside physicians.

Total number of deaths 49, of which 12 were treated by outside physicians; of those treated by the hospital staff, 9 were in a dying condition when admitted. The total percentage death rate was 2.9; of those treated by the hospital staff 2.6 per cent, deducting the 9 patients in a dying condition when admitted from the total number of cases treated by the hospital staff shows the remarkably low rate of 1.92 per cent. The death rate for those cases treated by physicians other than the hospital staff was 6.52 per cent.

The classification of medical and surgical cases is shown in detail below. In many cases patients were treated for more than one disease, and a very large portion of the surgical cases were treated for ailments included in the list of medical cases, hence the excess of diagnoses over number of patients admitted.

The total number of days spent in hospital by all patients was about 24,000, of which number about 22,000 were by those treated by the hospital staff.

The following summary shows the work done by the attending physician and surgeon, with the assistance of the house surgeons, for those not in hospital, viz:

Number of patients seen and prescribed for in office	15,550
Number of calls made in the city	2,555
All patients in hospital seen twice daily	44,000
Total times patients visited by the attending physician and surgeon during the year	62,105

(This does not include major or minor operations or confinement cases.)

For the benefit of civil employees located in the provinces, where medicines and medical attendance can not easily be had, upon proper request, the hospital furnishes what we term an "emergency package" of simple remedies, etc. This package consists of 100 5-grain quinine tablets, 25 5-grain phenacetine tablets, 50 quinine, phenacetine, and Dovers powder capsules, 50 salol, bismuth, and opium tablets, 8 ounces Epsom salts, 36 compound cathartic pills, 2 ounces carbolized vaseline, 3 gauze bandages, 1 yard plain gauze; and to the above is sometimes added 25 salol tablets, 25 salol and pepsin tablets, 100 iron, quinine, and strychnine pills, 25 camphor and opium pills, 1 ounce iodoform, 1 ounce calomel, 2 ounces vaseline.

About 200 of these packages have been furnished during the year.

The total number of prescriptions filled at the hospital dispensary, for those not in hospital, during the year is 7,932.

The total number of dressings done in the operating and dressing rooms during the year is 10,542. There were about 846 minor operations performed during the year upon patients not confined in hospital.

The personnel of the hospital consists of 1 attending physician and surgeon, 2 house surgeons, 1 pharmacist, 1 superintendent, 1 clerk, 1 interpreter, 1 chief nurse, 1 matron, 1 dietist, 1 operating nurse, 13 nurses, 10 male attendants, 1 native practicante, 2 ambulance drivers, 4 Chino cooks, and 32 native servants.

The hours of service are necessarily long. The surgeons are on duty subject to call all the time, and not infrequently engaged in twelve to eighteen hours hard work within the twenty-four. The office of the hospital is open daily, including Sundays and holidays, for twelve hours. The nurses and attendants regular tour of duty is eight hours daily, with one day off every two weeks, but they are often called upon to work overtime.

I again earnestly recommend the erection of a modern hospital building at the earliest possible time, where a better and more economical service can be given. While the present location and buildings are fair, they are by no means desirable; the buildings being so old and cheaply constructed as to require an excessive amount of repairs and service to maintain properly.

The matter of a training school for native women I have recommended each year and I sincerely hope that favorable action will be taken in the near future. I believe and reiterate that they will through this education prove a determining influence in decreasing the mortality among the mothers and the babies of these islands in educating the native women to understand and exercise the necessary care for the health of their children.

Very respectfully,

H. EUGENE STAFFORD,
Attending Physician and Surgeon,
Civil Officers and Employees.

The SECRETARY OF THE INTERIOR, *Manila, P. I.*

MEDICAL CASES.

	Male.	Female.	Deaths.
Alcoholism	56	.....	.....
Amebiasis	180	33	1
Anæmia	1	1	.....
Angio-polio myelitis	1	.....	.....
Ascariasis	27	.....	.....
Asthma	8	1	.....
Arthritis, subacute	1	.....	.....
Ataxia, locomotor	3	.....	.....
Beriberi	11	.....	1
Bright's disease	1	.....	.....
Bronchitis:			
Acute	14	.....	.....
Subacute	1	.....	.....
Cardialgia	1	.....	.....
Cardiac hypertrophy	1	.....	.....
Cranialgia	1	.....	.....
Cirrhosis of liver	3	.....	1
Colic, renal	3	1	.....
Colitis:			
Acute	7	4	.....
Chronic	2	1	.....
Cholera suspect	1	.....	.....
Cholecystitis	1	.....	.....
Conjunctivitis:			
Acute	3	.....	.....
Acute, purulent	5	.....	.....
Phlyctenular	1	.....	.....
Subacute	1	.....	.....

MEDICAL CASES—Continued.

	Male.	Female.	Deaths.
Constipation	27	1	
Delirium, alcoholic	3	1	1
Dementia		1	
Dengue	15	10	
Dermatitis:			
Simple	3		
Purulent	1		
Venenosum	2		
Diaphragmatic pleurisy	1		
Dhobie itch	6		
Duodenitis, hastro, acute		1	
Dypsomania	4		
Dysentery:			
Acute bacillary (Flexner)	1	1	
Catarrhal	34	4	
Ecthyma	2	1	
Eczema of toes	1		
Entero colitis	21	9	
Epididymitis	18		
Episcleritis	1		
Erythema multiforme	1	1	
Erysipelas of leg and thigh	1		
Encephalitis:			
Acute		1	1
Chronic	1		1
Facial paralysis, right side	1		
Fermentation, intestinal		1	
Fever:			
Rheumatic		1	
Undetermined	7	2	
For observation	1		
Furunculosis	6	3	
Glanders	1		1
Ganglion		1	
Gastritis:			
Acute	6	1	
Chronic	10	1	
Gastro-enteritis	13	3	2
Gastro-duodenitis	4	1	
General debility	6		
Gingivitis and stomatitis	1		
Gonorrhœa	20		
Gout	1		
Gumma of brain	1		
Hemicrania	1		
Hemiplegia	3		
Hepatitis	2		
Hemorrhage, cerebral	1		1
Herpes zoster	1		
Hordeolum	1		
Ilio-colitis	5		
Influenza	1		
Indigestion, intestinal	29	1	
Intestinal hemorrhages of stomach and bowels due to alcoholism	1		1
Intestinal:			
Parasites	2		
Auto-intoxication	1		
Insomnia	1		
Iritis	3		
Jaundice:			
Catarrhal	1		
Traumatic	1		1
Keratitis:			
Interstitial	1		
Phlyctenular	1		
Laryngitis, subacute	1		
Leprosy	1		
Lumbago	5		
Malaria	54	9	1
Aestivo autumnal	37	4	
Cachexia	4		1
Chronic	6		
Pernicious	10		6
Quartan	2		
Quotidian	2		
Tertian	80	1	
Malingerer	2		
Melancholia	3		
Meningitis, cerebro-spinal		1	1
Menieres disease	1		
Mitral:			
Regurgitation	2		
Stenosus	1		

MEDICAL CASES—Continued.

	Male.	Female.	Deaths.
Morbus cordis valvulos, mitral	1		
Myalgia	1		
Myalgia of arm	1		
Myelitis of cord at second dorsal vertebra	1		1
Nephritis:			
Of pregnancy		2	
Acute	3	1	
Interstitial	3		
Parenchymatous, acute	2		
Parenchymatous, chronic	4	1	1
Neurasthenia	11	8	
Melancholia	1		
Shock		1	
Neuralgia	2		
Facial	1		
Neuritis:			
Brachial left		1	
Alcoholic	1		
Peripheral and partial paralysis	1		
Œdema of right arm	1		
Œdema angio-neurotic		1	
Œdema of legs	1		
Ophthalmia:			
Acute (Kock-Week)	1		
Gonorrheal	1		
Orchitis	11		
Epididymitis	2		
Organic heart lesion	2		
Otitis:			
Externa	1		
Media	5	1	
Odontalgia	1		
Paralysis of right and left legs, right arm due to compression over rolandic area	1		
Partial asphyxiation	1		
Paratyphoid	1		
Pharyngitis	1		
Plague suspected	3		
Pleurisy, plastic	1		
Pleurisy, with effusion	1		
Periostitis	2		
Peritonitis, tubercular	1	1	1
Pneumonia:			
Lobar	8		1
Lobular		1	
Traumatic		1	
Plague	1		1
Poisoning, gas inhalation	1		
Psilosis		1	
Poisoning, suspected	1		
Poisoning, camphor	1		
Poisoning, carbolic acid	2		
Proctitis, acute		1	
Prostatitis	1		
Periostitis of tibia	1		
Ptomaine poisoning		2	
Pulmonia	1		
Purpura hemorrhagica		1	1
Ptyalism	3		
Rheumatism:			
Articular acute	4		
Muscular	4		
Monoarticular	2		
Gonorrheal	1		
Scabies	1		
Smallpox	1		
Smallpox suspect	1		
Septicemia	1		1
Spleen, malarial enlarged	1		
Senility	1		1
Strenua dorsi	1		
Sunburn	1		
Syncope	1		
Syphilis	2		
Secondary	7		
Tertiary	2		
Tabes dorsalis	1		
Tetanus, suspected	1		
Trichocephalus dispar	1	2	
Tonsilitis, follicular	1		
Torticolis	1		

MEDICAL CASES—Continued.

	Male.	Female.	Deaths.
Tuberculosis:			
Acute	4	.....	.....
Fibroid	1	.....	.....
General	3	.....	1
Glandular	2	.....	.....
Incipient	2	1	.....
Pulmonary	19	3	1
Typhoid fever	13	4	2
Ulcers, gastric	1	.....	.....
Uncinariasis	11	.....	.....
Undetermined	7	.....	.....
Uremia	1	.....	1
Urticaria	1	.....	.....
Vulgaris, acute	1	.....	.....
Whooping cough	1	1	.....
Yaws	1	.....	.....
Total	1,017	137	34

Total medical cases, 1,154.

SURGICAL CASES.

Abrasion:			
Arm	1	.....	.....
Cornea	1	.....	.....
Foot	1	.....	.....
Abscess:			
Alveolar	1	.....	.....
Appendicular	1	1	.....
Back, tubercular	1	.....	.....
Buttock	1	1	.....
Ear, left	1	.....	.....
Breast	1	.....	.....
Ischorectal	3	1	.....
Knee, tubercular	1	.....	.....
Liver	6	1	2
Liver and lung	2	.....	1
Mammary	.....	1	.....
Plantar	1	.....	.....
Pelvic	.....	1	.....
Peri-urethral	3	1	.....
Splenic	.....	1	.....
Submaxillary	.....	1	.....
Thigh	1	1	.....
Whole right lung, with hemorrhagic pleurisy and pericarditis	1	.....	1
Adenitis:			
Inguinal	13	.....	.....
Femoral	1	.....	.....
Inguinal, nonvenereal	5	.....	.....
Tubercular	1	.....	.....
Amputation of—			
Hand at wrist	1	.....	.....
Leg, right	1	.....	.....
Two fingers, right hand	1	.....	.....
Toe	2	.....	.....
Anæmia	1	1	.....
Appendicitis:			
Acute catarrhal	23	7	1
Chronic	1	1	.....
Gangrenosus	1	.....	.....
Obliterans	1	.....	.....
Suppurative	4	.....	.....
Bartholinitis, left, nonsuppurative	.....	1	.....
Burn	2	.....	.....
Gasoline	1	.....	.....
Electric	1	.....	.....
Hot water	1	.....	.....
Bursitis of foot	.....	1	.....
Carbuncle	4	.....	.....
Carcinoma of breast	.....	1	.....
Chancroid	1	.....	.....
Cellulitis:			
Foot	2	.....	.....
Hand	1	.....	.....
Legs	3	2	.....
Cicatricial contracture of thumb	1	.....	.....
Circumcision	5	.....	.....
Concussion:			
Cerebral	1	.....	.....
Brain and contusion of face and arms	.....	1	.....

SURGICAL CASES—Continued.

	Male.	Female.	Deaths.
Contused ankle	1		
Contused elbow	1		
Contusion:			
Arm	1		
Back	2		
Chest	2		
Face	2		
Hip	1		
Foot	1		
Hand	1		
Side	1		
Shoulder	1		
Head	1		
Cowperitis, suppurative	1		
Cyst on hand	1		
Cystitis	11		
Empyema of antrum of Highmore	1		
Enucleation of eye	2		
Extirpation of testicles	1		
Exophoria		1	
Entropion	1		
Fracture:			
Clavicle	3		
Colles	1		
Elbow	1		
Femur	2		
Intracapsular of humerus	1		
Lower jaw	1		
Fourth metacarpal bone of right hand	1		
Tibia and fibula	1		
Upper maxilla and contusion of face	1		
Compound, elbow	1		
Compound, leg	2		
Compound radius	1		
Compound, skull	1		1
Fissure in ano	2		
Fistula in ano	5		
Fistula vesical	1		
Gangrene:			
Lung and toximia	1		1
Intestines	1		1
Glaucoma and iridectomy		1	
Growth in left breast	1		
Hæmotoma on right hip	1		
Hemorrhoids	10	1	
Hernia:			
Inguinal	14		
Inguinal, strangulated	2		
Ventral		1	
Hydrocele	6		
Impacted cerumen	2		
Infected finger	5		
Infected toe	3		
Infected thrombus of skull and abscess	1		1
Infection of ankle	1		
Infection of foot	9		
Infection of thumb	2		
Intestinal perforation and peritonitis	1		1
Ingrowing toenail	2		
Laceration urethra	1		
Lymphadenitis	1		
Inguinal nonvenereal	1		
Lymphosarcoma colli	1		
Mammitis, suppurative		1	
Mastitis, chronic		1	
Moveable kidney right nephrophexy		1	
Necrosis of phalanx of little toe	1		
Needle in right arm		1	
Neurectomy	1		
Pelvic adhesions		1	
Perinephritis, suppurative	1		
Peritonitis, purulent following traumatic perforation	1		1
Peritherial hæmangio sarcoma of uterus and abdominal walls		1	
Pterygium	3		
Prolapse of rectum	1		
Pyelonephritis		1	
Pyelitis and cystitis	1		
Removal of corns	1		
Retention of urine, acute	1		
Retroversion, catarrhal appendicitis		1	
Ruptured aneurism of superficial femoral artery		1	
Rupture of urethra and perineal abscess	1		
Sarcoma right knee		1	
Sprained ankle	5		

SURGICAL CASES—Continued.

	Male.	Female.	Deaths.
Sprained back	1		
Sprained rectomuscle	1		
Sprained thumb	1		
Sprained wrist and hand	1		
Stricture of urethra	2		
Shock following extirpation of a multilocular ovarian cystoma weighing about 50 pounds		1	1
Spondylitis	1		
Suppuration in hernia vaginalis	1		
Suppuration of chest wall and bone cave of ribs	1		
Traumatic puncture of sclera of right eye	1		
Traumatism of finger	1		
Tonsilitis, acute, suppurative	1		
Tumor of neck	2		
Ulcers ankle		1	
Ulcers on buttock	1		
Ulcers of foot	1		
Ulcer of leg	2		
Ulcers molle	1		
Ulcers tropical	1		
Urethritis	6		
Acute gonorrheal	4		
Traumatic	1		
Urethritis and cystitis	1		
Urethritis and periurethral abscess	1		
Urethro-vulvo-vaginitis with abscess of glands		1	
Varicocele	10		
Vesical calculus	1		
Wounds of head and face	1		
Wounds:			
Abdominal	1		
Contused—			
Ankle	2		
Forearm	1		
Foot	2		
Head and hip		1	
Knee	5		
Leg	2		
Neck	1		
Thigh and face	1		
Contused and lacerated—			
Finger	1		
Side and scrotum	1		
Gunshot—			
Back	1		
Chest and lung	1		1
Foot	1		
Both legs	1		
Leg, left	2		
Shoulder	1		
Right shoulder, right wrist, left hand, and both legs	1		
Thigh	4		
Thigh and abdomen	1		1
Arm	1		
Arms and fracture compound humerus	1		
Lacerated, thigh and leg	1		
Incised—			
Hands and chest	1		
Foot	2		
Arm and cellulitis	1		
Back	4		
Lips and cut tendoachilles	1		
Wrist	1		
Infected—			
Arm	1		
Hand	2		
Head	1		
Lacerated—			
Arm	1		
Hand, disarticulation of fourth, little finger	1		
Head	4		
Foot	2		
Lacerated and fracture, finger	1		
Punctured—			
Face	1		
Foot	2		
Leg	1		
Stab of chest and face and shock following hemorrhage	1		
Stab of epigastrum	1		
Suppurating neck	1		
Total	354	43	14

Total surgical cases, 397.

GYNECOLOGICAL AND OBSTETRICAL.

	Female.	Death.		Female.	Death.
Abortion	1		Ovarian, left	1	
Attempted	1		Placentæ previa	1	
Threatened	1		Prolapse:		
Confinement	77		Uterus	1	
Cyst of broad ligament	2		Left ovary and extensive adhesions laparotomy ventro suspension	1	
Curretment	2		Pyosalpinx	2	
Cyst adenomatous left mamma	1		Rupture of uterus	1	
Dysmenorrhœa	1		Recto-vaginal fistula	1	
Eclampsia complicating pregnancy	1	1	Rectocele and perineorrhaphy	1	
Endometritis	12		Retroversion	3	
Chronic	1		Sapræmia following childbirth	1	
Laceration:			Vomiting of pregnancy	5	
Cervix, utero	2		Total	133	1
Perineum	1				
Menorrhagia	1				
Miscarriages	4				
Nausea from pregnancy	2				
Ovarian cyst	2				
Right side	2				
Multilocular	1				

Total cases: Male, 1,371; female, 313; deaths, 49. Grand total: Male and female, 1,684; deaths, 49.

APPENDIX G.

ANNUAL REPORT, CIVIL SANITARIUM, BENGUET.

CIVIL SANITARIUM, BAGUIO,
Benguet, P. I., July 1, 1905.

SIR: I have the honor herewith to submit my report for the period September 1, 1904, to June 30, 1905.

DISEASES TREATED.

During the past six months the town of Baguio and the neighboring villages of the province of Benguet have been so thoroughly invaded by laborers of all nationalities coming here in connection with the completion of the Benguet road and of the government works under way in Baguio that the diseases encountered here have become almost cosmopolitan in variety and are no longer of interest as indicating the morbidity of the native races.

Ninety-nine patients were treated in the sanitarium; 43 whites, 15 Filipinos, 23 Igorrotes, and 18 Japanese. Sixty-four patients were cured, 28 improved, 2 unimproved, and 5 died. Of the fatal cases, 1 Igorrote died of pernicious malaria, 1 American negro of abdominal wounds, 1 American of smallpox, 1 Filipino of epidemic cerebro-spinal meningitis, and 1 Igorrote of typhoid. The following are some of the more important diseases encountered: Anaemia, asthma, appendicitis, beriberi, dengue, amœbic dysentery, diarrhea, valvular heart disease, indigestion (gastric and intestinal), malaria (æstivo-autumnal), meningitis (epidemic cerebro-spinal), pneumonia, syphilis, sprue, typhoid, tonsillitis (acute follicular), variola, uncinariasis.

In the out-door department 273 persons were treated at the dispensary or at their homes, and there were 933 revisits. About one thousand vaccinations were performed in and about Baguio.

About 1,300 prescriptions were filled at the sanitarium pharmacy.

BERIBERI.

In my last report I described three cases of beriberi, the only ones that had occurred here up to that time.

The disease persisted in a mild form during the rainy season of 1904 and well into the late fall, disappearing finally when the cool weather was well established. Twenty-nine cases were treated by me in hospital and out-door department; 25 Igorrotes and 4 Ilocanos. With one exception the patients were members of the constabulary detachment quartered at Baguio, or were prisoners in the provincial jail, which is located a few hundred feet from the constabulary quarters. No fatal case occurred. Considering the susceptibility of the Japanese to this disease, it is notable that no case occurred among the large numbers of Japanese laborers employed in Baguio during the past year.

Most of the cases were extremely mild, about two-thirds of them presenting no other symptoms than more or less complete anesthesia of certain areas of the skin, notably over the shins, abdomen, and exterior side of the forearms. Several of these mild cases presented histories of previous attacks of ill-defined illness, followed by long convalescence and weakness in the legs, and I believe that the recent sensory phenomena that I elicited were residual—the remnants of peripheral neuritis incident to a previous acute attack of beriberi and lighted up by a prolonged and cool rainy season and by crowded life in barrack and prison.

Upon my recommendation, a new temporary jail was erected by the provincial authorities, the old one being judged too damp and dark for the proper protection of the prisoners. A temporary house was also erected by the constabulary in order that the affected and non-affected soldiers might be separated, and that the crowded condition of the old quarters might be relieved.

The disease is without doubt much modified by altitude, and it is affirmed by some writers on tropical medicine that beriberi seldom exists at a greater altitude than 3,000 feet.

A generous, varied diet seems to afford no protection against the disease, though doubtless underfeeding may predispose to it, as it does to most diseases.

The disease appears often to select muscular and robust subjects by preference.

As a result of my observations of the Baguio epidemic I believe that beriberi is an infectious disease, having its origin in the gastro-intestinal canal, where the specific agent, be it bacterium, yeast, or toxic product, should be sought.

Overcrowding and dampness are very important predisposing conditions.

DYSENTERY, AMŒBIC.

Among the 14 cases of amœbic dysentery treated in the sanitarium wards during the past ten months, 6 were discharged apparently cured, 7 were improved, and 1 was unimproved; 12 were Americans and two Japanese. Two of the Americans who recovered had suffered severely for several months in Manila without prospects of relief, The two Japanese were laborers at the government farm at La Trinidad, but one of them had just come from a year's service at one of the lower road camps, where he doubtless contracted the disease.

It is notable that no case of amœbic dysentery occurred among the fifty or more Japanese carpenters and laborers employed about the sanitarium.

I have not yet met with a case of amœbic dysentery among the Americans who are permanent residents of Baguio, except in one or two instances, where the proof is conclusive that they were already infected when they arrived at Baguio.

My opinion of the beneficial effects of the Baguio climate in this disease has been strengthened by my observations during the past season. Patients who carefully carried out instructions as to exercise, diet, and treatment rarely failed to derive prompt and marked benefit.

INDIGESTION.

Indigestion has occurred very commonly again this past year, particularly among the newcomers and at the beginning of the rains. The great majority of cases have had accompanying gastric-hyperacidity and more or less diarrhea. Dr. M. Herzog, pathologist of the bureau of government laboratories, spent several days at the sanitarium during the season studying the etiology of these gastro-intestinal affections, but has been unable to isolate any specific agent.

All the facts still point to climatic conditions as the direct cause of the frequent occurrence of indigestion and diarrhea among the temporary population at Baguio, and further experience during the past few months leads me to believe that in the majority of cases the initial departure from normal is gastric hyperacidity, which induces a secondary diarrhea.

MALARIA.

Thirty-seven cases of malaria were treated in the wards and out-door department during the past ten months, most of them of the benign tertian form, but for the first time pernicious cases occurred in my practice here. There were 2 such cases, 1 an Igorrote boy who was brought here in a dying condition from the lowlands, and the other, a Japenese carpenter, though comatose for about forty-eight hours after admission, recovered under heroic doses of quinine administered hypodermically.

In both cases the blood contained great numbers of ovoid and crescentic bodies.

MENINGITIS, EPIDEMIC CEREBRO-SPINAL.

Only 3 cases of this dreaded disease have occurred this season, 2 Igorrotes (man and boy) who recovered and 1 Ilocano (man) who died within less than a week after the initial symptoms.

PARASITES, INTESTINAL.

Since my report of 1903–1904 I have made many microscopical examinations of stools of Americans, natives, and Japanese, with results of some interest.

One series of 27 examinations was conducted among members of the Baguio detachment of constabulary, giving a saline carthartic before breakfast in each case and subjecting the watery portion of the stool to microscopic examination. It should be noted that although these men are stationed in Baguio, they are frequently sent on duty to all parts of the province and to the adjacent lowlands. Twenty-two were Igorrotes and 5 Ilocanos. Three were suffering with acute beriberi and 12 presented signs of residual neuritis, but were otherwise apparently in good health. The rest of the men were picked at random and were apparently healthy. The examination was undertaken with the purpose of studying the etiology of beriberi, but was in that respect fruitless.

	Igorrote.	Ilocano.
Ova of the ankylostoma were found in 11 cases	9	2
Ova of the Ascaris lumbricoides were found in 10 cases	9	1
Ova of the Trichocephalus dispar were found in 13 cases	11	2
Amœbæ were found in 1 case	1	.....
Flagellates in great number in 3 cases	3	.....

Considering the theory at one time advanced suggesting the ankylostoma as the possible causative agent of beriberi, it is interesting to note that only 5 of the 11 ankylostoma infections occurred in beriberi patients, of whom there were 15.

The only case where amœbæ were found was that of an apparently healthy Igorrote.

The most suggestive result of the examinations was the large percentage of ankylostoma infections found to exist in men who gave no symptoms of ankylostomasis; furthermore, there was no case in which the ova were found in large numbers. These facts suggest that the ankylostoma may often inhabit the intestine without prejudice to its host, or possibly that the parasite may not find satisfactory conditions for growth or pathogenic activity at this altitude.

Among other examinations I have found the ankylostoma ova in very small numbers in 1 case of sprue, the patient an American, and 2 cases of amœbic dysentery, both Japanese.

Roundworms and whipworms occur so commonly in all latitudes that their presence in these cases was of no particular interest.

PNEUMONIA.

I make special mention of this disease because of the rareness of its occurrence in this locality.

One case of lobar pneumonia occurred, the patient an Igorrote schoolboy, and 1 case of broncho-pneumonia, the patient a Filipino. Both recovered.

TONSILITIS.

It is interesting to note the occurrence of 5 cases of acute follicular tonsilitis, a disease that in my experience seldom occurs in the tropical lowlands. All 5 cases were mild compared with the form of the disease as usually encountered in the northern part of the United States.

TYPHOID.

The appearance of typhoid fever in Baguio is to be regretted, but in spite of the difficulties presented by lack of a sewage system and of a protected water supply, and in spite of the necessity of dealing with ignorant and strange races, the disease was soon controlled, and no new case has developed since the middle of April, 1905.

Seven cases developed in Baguio—1 American, 1 Igorrote, and 5 Japanese carpenters, the latter being quartered with 40 to 50 other Japanese on the lower floor of the servants' barracks, where they also conducted their mess. One patient, the Igorrote, died of septic peritonitis following perforation of an intestinal ulcer.

After the disease was recognized, care in regard to the disinfecting and covering of stools in the earth closets was redoubled, the importance of drinking boiled water explained repeatedly to all, and a crusade against the flies begun, with especial reference to keeping them from the food.

All drinking water for the sanitarium was hauled from the distant Bued River spring, and boiled as an extra precaution. Servants' quarters and all native shacks in the neighborhood of the sanitarium were inspected daily, both to enforce cleanliness and to detect incipient cases of typhoid at the earliest possible stage of their development. This care, in frequently disinfecting excreta and in taking charge of all fever cases as soon as discovered, was strikingly justified in constabulary quarters, where only a single case occurred among the thirty to forty members who live and mess together. The origin of the infection among the Japanese is uncertain, but it is more than probable that the single Igorrote constabulary soldier was infected at one of the lowland road camps, which he visited ten to fifteen days before the first symptoms of his illness developed.

The disease was of a severe type when one considers that 1 patient out of 7 died and 2 others suffered with severe complications. Two patients had perforation of the intestine with resultant septic peritonitis; both cases were operated on, 1 died and 1 recovered without further setback. One patient developed the somewhat rare complication of double parotitis.

During this typhoid epidemic I was more than ever impressed with the importance of completely dividing the hospital from the main sanitarium, and strongly recommend that

this be done before the beginning of the next summer season, even if one of the cottages has to be set aside for the care of the sick. The location of a general hospital in the center of a hotel is undesirable under any circumstances, and when typhoid fever and epidemic meningitis make their appearance in the wards the condition becomes rather hazardous, even with the most painstaking precautions of physicians, nurses, and attendants.

TUBERCULOSIS.

I have nothing to add to my report of last year, for I have not seen a case of tuberculosis in Baguio, among Americans or natives, during the past ten months.

VARIOLA.

Smallpox invaded Baguio and the sanitarium itself this season. There were 7 cases in all, 6 Ilocanos and 1 American. The latter died; the 6 Ilocano muchachos recovered. The cases varied in severity from the fatal, confluent case to three or four cases so mild that except for the accompanying severe cases it would have been impossible to determine whether they were varioloid or chicken pox. The entire community was vaccinated and exposed persons were vaccinated two and three times.

IMPROVEMENT OF GROUNDS.

Since the early part of February this work has been carried on under the direction of Superintendent H. E. Smith.

Two new tennis courts and a croquet court were leveled off, involving considerable labor in cutting, filling, and finally tamping the grounds several times.

Several hundreds of banana trees, ferns, and shrubs have been planted about the sanitarium and cottages since the beginning of the rains, and about three hundred and fifty yearling coffee plants have been carefully set out. Extensive terraces have been sodded. Many permanent drains have been constructed; also stone steps to take the place of the slippery wooden steps, and paths of pounded rock. These two latter improvements add much to the comfort of walking during the rainy months, and lessen the amount of dirt tracked into the buildings. Many of the terraces have been tastefully edged with stone.

Thanks to our new water supply, we shall be able to keep our plants and terraces green during the dry season. We have 250 feet of hose for this purpose, and to use in case of fire. Twelve street lamps have been put up about the sanitarium and cottages and on the connecting roads and paths.

SUBSISTENCE.

A very radical improvement in the food supply was made possible during the busy season by the opening of the Benguet road to wagon transportation. Early in the season arrangements were made by which we received refrigerated beef three times a week. This was transported to Camp Four from the refrigerator cars at Dagupan in specially constructed, air-tight carts, and from Camp Four to Baguio it was, during part of the season, hurried up the trail in light wagons or wrapped in canvas or burlap and carried by Igorrote polistas. In this way the meat was received in good condition, and after arrival at Baguio remained sweet for twenty-four to forty-eight hours if kept in a cool place. Fresh butter, onions, potatoes, and even fish were transported in the same way. Chickens and eggs in sufficient quantities were brought up the western trail by retail dealers from the small towns of the province of La Unión, and the agricultural station at La Trinidad supplied us with large quantities of green vegetables. We only had to ship a few crates of Irish potatoes from Manila, as we were able to get almost our entire supply from crops raised in this vicinity. The quality of the Benguet potato was notably superior to that of the imported article.

The one important article of diet that the sanitarium still lacks is fresh milk, and it is very important that enough good milch cows to meet that want should be sent to Baguio as soon as possible after the end of the present rainy season.

PERSONNEL.

A number of changes have taken place in the personnel of this bureau during the past year.

The attending physician and surgeon was absent on leave from November 10, 1904, to December 4, 1904, and on detail in the bureau of government laboratories, Manila, during the months of December, 1904, and January, 1905, during which period Dr. W. J. Mallory was detailed from the Philippine Civil Hospital, Manila, to take charge of the sanitarium.

Mr. H. E. Smith was appointed on January 28, 1905, by transfer from the position of property clerk, Philippine Civil Hospital, to that of superintendent Civil Sanitarium, under Act No. 1225.

He also relieved Mr. Morton L. Monson as property officer and cashier, the latter still retaining the position of disbursing officer.

Miss Marcella Doyle, nurse and housekeeper, was absent on leave from June 7, 1904, to December 8, 1904, Miss Catherine Cleland, nurse, performing the duties of the position during Miss Doyle's absence.

Mr. Alfred Ascher, detailed from the Philippine Civil Hospital, assisted Mr. Monson in the office while the latter was property officer and cashier, returning to his bureau, Manila, February 28, 1905.

Under resolution of the Philippine Civil Commission, dated January 5, 1905, the position of clerk was created, this being filled by Mr. William L. Jenkins, a temporary appointee, from February 1 to March 15, 1905. Mr. George L. Chauvin was appointed clerk on March 16, 1905, by transfer from the position of attendant at the Philippine Civil Hospital.

Mr. William H. Smith was appointed attendant August 28, 1904, having been on temporary detail since the middle of May, 1904. He has been acting as dispensary clerk during the greater portion of the time.

Mr. Charles H. Miller was appointed, by transfer from the insular purchasing agent February 7, 1905, to take charge of the sanitarium stables, to succeed George B. Mead, resigned.

During the early part of the calendar year Dr. H. L. Casey, director of studs, bureau of agriculture, was by order of the honorable secretary of the interior, put in charge of all the sanitarium stock, including ponies and cattle.

An important addition to the personnel was authorized by resolution of the Commission, dated January 4, 1905, by which the surgeon in charge was empowered to employ, beginning February 1, 1905, "such of the following additional employees as increasing attendance at the sanitarium may make necessary," viz, 1 clerk, 1 diet cook, 4 coolies, 1 cart driver, 15 muchachos to serve as waiters and room boys, etc., and 8 boys for employment in the stables.

A still more important change in the personnel was inaugurated by resolution of the Commission, dated February 27, 1905, which authorized the employment of a Chinese steward, an assistant cook, 5 Chinese waiters and room boys, and 2 Chinese coolies, with the further provision that a "further increase in the number of table and room boys be authorized at the rate of 1 table and room boy for each 10 guests in excess of 50." It was also provided that as many as possible of the low-salaried native employees should be discharged at once.

This substitution of trained Chinese waiters under the supervision of a Chinese No. 1 boy for the Ilocano waiters heretofore employed gave very great satisfaction during the busy season just passed. At times from fifty to sixty persons at a meal were served in the dining room promptly and without confusion.

Owing to the rapid decrease in the number of our guests since the rains began, all of these extra Chinese servants but two were discharged and returned to Manila, but it is very desirable that arrangements be made to secure their services (or those of equally good waiters) early next season.

At the height of last season the sanitarium employed 3 cooks, 23 waiters and muchachos, 4 coolies for outside work, 8 stable boys, and 9 white employees, of whom 2 were detailed from the Civil Hospital; total, 47. At the present time we have 7 white employees (including the surgeon in charge), 2 cooks, 7 waiters and muchachos, 2 outside coolies, and 3 stable boys; total, 21.

EXPANSION OF SANITARIUM.

By the addition to the sanitarium of the two-story extension, the plans of which were described in my last year's report, our capacity has been doubled. The extension contains 15 double and 8 single rooms and was first occupied by guests February 22, 1905.

About the first of the year the new kitchen and dining room were finished. Another range was installed in the kitchen, to be used exclusively by the diet cook. The new dining room is well lighted and commodious, with comfortable seating capacity for 60 persons and for 70 persons by crowding the tables somewhat.

The dining room was found to be very suitable as a social hall and was frequently used in the evenings for card parties and for dancing.

The old dining room was divided by a partition into two parts, one of which was used by the female nurses as a dining and sitting room and the other converted into a small mess room for the male employees of the sanitarium.

Probably the most important addition to the sanitarium this year was the 8-inch cylinder Rider-Ericsson hot-air engine and the water tower installed during the month of April. The pump easily lifts 2,000 gallons of water a day to the top of the water tank, a vertical height of nearly 100 feet. The capacity of the tank is 3,000 gallons, the tower is 45 feet high, and the elevation of the tank is sufficient to force water over the highest roof of the sanitarium buildings.

Kitchen, pharmacy, bathrooms, and sinks are abundantly supplied with running water, and we shall be able to save our sodding and decorative plants during the dry season.

The water system will be a most important aid in case of fire, and as additional precautions 16 chemical fire extinguishers were set up in different parts of the building and the forty or more servants organized into a fire brigade and drilled at frequent intervals.

Early in the year a set of night-soil buckets were bought from the city of Manila, by courtesy of the city engineer, and the so-called "pail system" was inaugurated. This arrangement has been most satisfactory. The contents are treated each morning with crude carbolic acid, the pails closed and carted to a pit about one-quarter of a mile from the sanitarium, where they are emptied and washed.

Other minor additions to the sanitarium were a chicken house, a large detached water-closet for men, and a small night-soil house. All of these are built substantially of wood and have shingle roofs.

The pesthouse was finished about May 1, but fortunately has not been needed since its completion.

About May 1 the engineer of the Benguet Road completed a narrow wagon road from the main road to the Bued River spring, and the sanitarium at once began to haul all its drinking water from that source.

RECEIPTS AND DISBURSEMENTS.

During the ten months covered by this report the total disbursed for salaries and wages was ₱18,794.79; for contingent expenses, ₱65,861.79, including ₱19,000 for payment of requisitions on the insular purchasing agent; for improvement of grounds, ₱3,149.62, leaving under the latter head a balance of ₱36.94 remaining from the special fund of ₱5,000 appropriated by Act No. 807; grand total of disbursements, ₱87,806.20.

The total of receipts during the ten months covered by this report was ₱18,794.79, as compared with ₱10,273.28 collected during the twelve months ending August 31, 1904.

Statistical tables giving the above data in detail and including the two remaining months of July and August, 1905, will be submitted by my successor with his supplementary report. I have also turned over to him my morbidity tables and tables of meteorological statistics in order that he may complete them with the statistics for July and August.

ATTENDANCE.

The daily average number of guests and patients accommodated during the ten months ended June 30, 1905, was 16 guests and 6 patients; total, 22. The greatest number present on any one day was 50 guests, 8 patients, and 9 servants of guests, registered on April 22, 1905. The busiest week during the season was that ended May 4, 1905, when the daily average present during the week was 46.7 guests, 7 patients; total, 53.7. During that week 8 or 9 private servants of guests were being subsisted each day.

The following figures represent the number of individuals that have availed themselves of the privileges of the sanitarium without reference to the number of days spent here from the foundation of the institution to June 30, 1905:

	Persons.
February 3 to June 30, 1902	38
Fiscal year, 1903	130
Fiscal year, 1904	204
Fiscal year, 1905	667

TRANSPORTATION.

January 29, 1905, Major Kennon, engineer in charge of Benguet improvements, formally opened the Benguet road by driving from Camp Four to Baguio in his carromata, and thus inaugurated a new era in the development of the province. However, it was necessary to do more grading before the road could be regularly used for wagon transportation, and the first stage came through to Baguio February 8, 1905, bringing Secretary Forbes, United States Minister Conger, and party.

About April 1, a time schedule was put in operation for the departure of stages from Dagupan to Baguio and return three times weekly.

For the accommodation of prospective travelers to Baguio a bureau of information was opened in Manila and the Bungalow Inn was maintained at Twin Peaks during the season.

Persons desiring to make the trip by slow and easy stages could leave Manila on the noon train, spend the night at Dagupan, leave there by constabulary stage at 6 o'clock the next morning, spend the next night at Twin Peaks, leave there by stage the next morning about 7 o'clock, and arrive in Baguio about 11 a. m.

Those desiring to make the trip more rapidly could leave Manila on the early morning train, take a carromata to Pozorrubio or Twin Peaks the same afternoon, and arrive in Baguio the next morning, twenty-eight to twenty-nine hours after leaving Manila.

I would suggest that during the coming year many persons who are accustomed to riding will find it more restful and more enjoyable to make the trip on horseback between Twin

Peaks or Camp Four and Baguio. Only by this method of travel or by walking can one fully enjoy the exhilirating mountain air and the superb mountain scenery incident to these last few miles of the road as it climbs from the foothills at Twin Peaks to the 5,000-foot plateau on which Baguio is situated.

RECOMMENDATIONS.

I have the honor to repeat my recommendations for a pavilion hospital at Baguio, as submitted in my last annual report.

Until such time as it may be deemed feasible to begin the construction of such a hospital, temporary separation of the hotel and hospital departments of the sanitarium could be effected by using one of the cottages as a sick pavilion and abandoning the ward in the main building of the sanitarium.

The sanitarium has developed into a large summer hotel, where the sick are in a small minority, and the presence in the building of patients suffering from such serious transmissible diseases as typhoid, epidemic meningitis, and beriberi not only constitutes a menace to the health of the guests but the latter are restricted in their amusements and in other ways by the presence in the hotel of acutely sick persons.

I would further recommend that in view of the fact that the sanitarium has no accommodations for women at the minimum rate of ₱2 per diem, though having ample accommodations for men at that rate, the ward used at present for the sick be reserved as a ward for women employees of the civil government, and the charge per occupant be maintained at the rate of ₱2 per diem.

Very respectfully,

J. B. THOMAS,
Attending Physician and Surgeon.

The SECRETARY OF THE INTERIOR,
Manila, P. I.

CLIMATE.

The accompanying table of Baguio statistics for the year beginning September 1, 1904, I have condensed from meteorological data furnished me by courtesy of the local observer, Gregorio Galvan:

The highest official temperature registered at this station during the year was 78.3° F., on April 20, 1905; the lowest was 43.7° F., on February 21, 1905.

The highest monthly average or mean maximum temperature was 74.3° F., for August, 1905, and the lowest or mean minimum temperature was 50.6° F., for February, 1905.

There were 159 days during which rain fell, and the rainfall for the twelve months reached the phenomenal total of 171.32 inches.

The highest monthly rainfall was 40.52 inches, in August, 1905. No rain fell during the months of December, 1904, and January, 1905.

The maximum rainfall in twenty-four hours occurred August 29, 1905, with a deluge of 23 inches. One other day of exceptional rainfall was July 1, 1905, 16.51 inches.

Baguio weather statistics, September, 1904, to September, 1905.

Date.	Rainy days.	Monthly rainfall.	Maximum rainfall in 24 hours.	Temperature.	Maximum temperature registered during month.	Minimum temperature registered during month.	Mean maximum monthly temperature.	Mean minimum monthly temperature.
1904.		*Inches.*	*Inches.*	°*F.*	°*F.*	°*F.*	°*F.*	°*F.*
September	29	20.38	2.98	.....	72.3	58.3	70.1	59.8
October	19	20.58	2.39	.....	76.3	57.2	71.1	58.6
November	11	6.01	2.17	.....	76.6	48.6	72.4	51.5
December	.....	.....	.....	.....	76.5	47.7	70.2	55.5
1905.								
January	.....	.....	.....	.....	72.7	49.6	67.4	54.2
February	1	.04	.04	.....	73.4	43.7	69.1	50.6
March	3	.77	.50	.....	77.2	48.2	69.4	52.6
April	9	6.50	4.65	.....	78.3	50.7	73.9	61.2
May	15	7.24	1.60	.....	76.6	53.6	74.2	57.5
June	26	29.11	5.94	.....	77.4	56.5	70.4	59.3
July	26	40.17	16.51	.....	76.3	54.7	71.3	58.8
August	20	40.52	23.00	.....	75.6	52.9	74.3	57.8

Total rainy days, 159; total monthly rainfall, 171.32 inches.

Cases treated in the sanitarium, September 1, 1904, to September 1, 1905.

Cause.	Americans.		Filipinos.		Igorrotes.		Japanese.	Total.	From Baguio or vicinity.	From Manila or provinces.	Cured.	Improved.	Not improved.	Died.
	M.	F.	M.	F.	M.	F.								
Abscess, alveolar							1	1	1			1		
Appendicitis, acute	1							1		1	1			
Beriberi, old			3		3			6	6		3	3	1	
Bladder, neuralgia	1							1		1	1			
Bronchitis, chronic	2							2	1	1	2			
Burn, carbolic acid	1							1	1		1			
Carbuncle					1			1	1		1			
Cellulitis, hand	1							1		1	1			
Chancroid	1							1	1		1			
Conjunctivitis, acute	1							1	1			1		
Constipation, acute			1					1	1		1			
Dengue							1	1	1		1			
Diarrhea, acute	1				1			2	1	1	1	1		
Dysentery														
Amœbic	14	2			1		3	20	15	5	14	5	1	
Catarrhal							1	1	1		1			
Enterocolitis	1							1		1		1		
Fracture:														
Ulna			1					1	1		1			
Clavicle	1							1	1		1			
Femur			1					1	1		1			
Tibia					1			1	1		1			
Gastritis, acute	1							1	1			1		
Heart disease, valvular	2							2	2			2		
Indigestion, acute	1	1			3		3	8	7	1	7	1		
Malaria:														
Tertian, pernicious					1		1	2	2		1			1
Benign, tertian					1			1	1		1			
Chronic	1		3		4		5	13	13		13			
Insolation	1							1		1	1			
Laryngitis					1			1	1		1			
Meningitis, cerebro-spinal, epidemic			1		1			2	2			1		1
Nephrotosis		1						1		1		1		
Neurasthenia	1							1		1		1		
Pneumonia, lobar					1			1	1		1			
Rheumatism, muscular							2	2	2			2		
Syphilis	1							1	1			1		
Sprue	2							2		2		3		
Typhoid	2				1		4	7	6	1	6			1
Tonsilitis, follicular		1						1		1	1			
Uncinariasis	1							1	1			1		
Variola	1		6					7	7		6			1
Wound:														
Foot							1	1	1		1			
Intestines	1							1	1					1
Knee	1				1			2	2		2			
Leg			1					1	1		1			
Total	41	5	17		21		22	106	87	19	74	26	2	5

Outdoor department, September 1, 1904, to September 1, 1905.

Cause.	Americans.	Filipinos.	Igorrotes.	Japanese and Chinese.	Total.	Operation.
Abscess	4	1	2	1	8	8
Amputation, finger			1		1	1
Ascariasis	1				1	
Asthma		1			1	
Beriberi		1	23		24	
Blepharitis		1			1	
Bronchitis	3	5	6	1	15	
Burn		2		1	3	
Bursitis, knee	1				1	1
Carbuncle			1		1	1
Cellulitis		1			1	1
Chancroid	1				1	
Colic		1			1	
Condyloma, venereal			1		1	
Constipation	2			1	3	
Coryza, acute		1			1	
Cystitis	3				3	
Dementia, acute		1			1	
Dermatitis, acute	3			1	4	
Diarrhea, acute	17	3		6	26	
Dysentery:						
Amœbic	7	1			8	
Catarrhal	7		3		10	
Dysmenorrhea		1	1		2	
Eczema	3	1	1	1	6	
Enteritis	2	1			3	
Fibromas, chest, etc		1			1	
Furuncles	4	3	3		10	
Gingivitis, ulcerative			3		3	
Goiter		1			1	
Gonorrhea	3	2			5	
Gout	1				1	
Harelip		1			1	1
Headache		1			1	
Heart disease, valvular			1		1	
Hemorrhoids	1				1	
Herpes zoster				1	1	
Impetigo			2		2	
Indigestion, acute	5	6		3	14	
Influenza	3	1			4	
Laryngitis, acute	1			1	2	
Lumbricoids	2				2	
Malaria	5	7	7	4	23	
æstivo-autumnal	3	1	2	3	9	
Metrorrhagia	1				1	
Miscellaneous	4	5	13	4	26	
Myalgia		1			1	
Neuralgia, intercostal	1	1		1	3	
Otitis media	1				1	
Pharyngitis	1		1	1	3	
Pneumonia, bronchial			1		1	
Scabies		1	2	5	8	
Sprain	6				6	
Syphilis	1				1	
Tinea circinata				2	2	
Teeth extracted	1	5	3	2	11	
Tobacco heart	1				1	
Tonsils, hypert		1			1	
Tonsilitis, follicular	4				4	
Ulcer			3	1	4	
Urethritis			1	1	2	
Vaccinations					649	
Variola	1				1	
Wounds:						
Incised			2		2	
Infected	6	1	4	1	12	
Lacerated	4	4	3	1	12	
Punctured		3	1		4	
Total	113	68	92	43	965	13
Revisits					854	
Grand total					1,819	13

Report of sanitarium laboratory, September 1, 1904, to September 1, 1905.

Nature of service.	Positive.	Negative.	Total.
Microscopical examinations for—			
Amœba dysenteriæ in fœces	14	75	89
Cercomonas in fœces	4	.....	4
Diplococcus intracellularis in spinal fluid	2	.....	2
Gonococci in pus	3	.....	3
Ova of ankylostoma in fœces	5	12	17
Oxyuris vermicularis in fœces	1	.....	1
Plasmodium malariæ	13	27	40
Trichocephalus dispar. in fœces	6	14	20
Tubercle bacilli in sputum	.....	3	3
Urinalyses	.....	.....	29
Total	.....	.....	207

WILLIAM J. MALLORY,
Attending Physician and Surgeon.

APPENDIX H.

REPORT OF THE CHIEF OF THE BUREAU OF FORESTRY.

MANILA, P. I., *August 31, 1905.*

SIR: I have the honor to submit herewith a report of the work of the bureau of forestry for the period from September 1, 1904, to August 31, 1905.

The following resolution of the Philippine Commission was passed on August 5, 1904:

"After consideration by the Commission. on motion, it was

"*Resolved*, That the Secretary of the Interior be authorized to direct Capt. George P. Ahern, chief of the forestry bureau, to proceed by first transport to St Louis, Mo., and to remain in the United States until the committee to be appointed by the civil governor, in accordance with the provisions of Act No. 827, to select the articles in the Philippine exhibit at the Louisiana Purchase Exposition which are to be returned to the Philippine Islands has completed its work, serving on this committee if so directed: *Provided*, That Captain Ahern shall not be allowed transportation expenses from Manila to St. Louis and return."

In accordance with instructions from the Secretary of the Interior, the undersigned left Manila on August 15, 1904, for the United States, and, upon completion of the work above mentioned, returned to Manila on March 2, 1905.

The undersigned attended the forest congress held in Washington, D. C., during the second week in January, and read a paper before that body entitled "Opportunities for lumbering in the Philippines."

The students from the forest schools at New Haven, Ann Arbor, and Biltmore attended the Congress. At the close of the Congress a series of lectures and addresses were given the students. The undersigned addressed them on the subject of "the Philippine forest service," and at the close of the address answered many inquiries from the students concerning our forest service, health conditions, civil-service rules, etc.

At this time the undersigned suggested to Mr. Gifford Pinchot, Forester of the United States, and connected with the Philippine forest service in an advisory capacity, that Dr. Henry S. Graves, director of the Yale forest school, be sent to the islands to inspect the forest service, with a view toward making suggestions for its betterment.

Doctor Graves visited India on his way to Manila, and spent some time in that country, observing the forests and the forest service. A forest service was established in India by the British Government about fifty years ago, and notwithstanding great difficulties—due to the large population claiming forest privileges—this service has steadily improved the forest conditions and has proven a source of profit to the central government as well.

Doctor Graves remained about six weeks in these islands, and, after inspecting a few forest stations, visited the forests in the provinces of Bataán, Tayabas, and Mindoro, where he had an excellent opportunity to see many different classes of forest, and also to see the class of work carried on by the forest officers. A series of lectures will be given by him to the students of the Yale forest school on the Philippine forests and the forest service of the islands.

Doctor Graves's report has not been received. Some valuable suggestions, however, were made by him at the time of his departure.

THE EXHIBIT OF PHILIPPINE FOREST PRODUCTS, ETC.

The exhibit of Philippine forest products at the Louisiana Purchase Exposition, St. Louis, Mo., by the Philippine bureau of forestry, excited much attention and awakened much interest in our valuable forest resources.

The exhibit was housed in a building constructed entirely of Philippine woods. The exhibit was a large and comprehensive one. A large number of logs, with and

without bark, were exhibited. Many logs were so cut as to show the grain to advantage, and the beautiful finish, as shown by single pieces of fine wood, five to ten feet in width, was marveled at by visitors. A large collection of handsome pieces of furniture was also on exhibition.

An elaborate exhibit was also made of minor forest products, such as bejucos, gums, resins, tan barks, and dyewoods. All specimens were plainly labeled, giving useful information.

A forest map, 16 by 13 feet (scale 6 miles to the inch) was made by this bureau and placed on exhibition. A large transparency of this map was also on exhibition.

The following extract was taken from the October number of Forestry and Irrigation:

"A finer display of different kinds of wood has probably never been made than that contained in the Philippine forestry exhibit at the World's Fair."

List of awards granted to bureau of forestry by the Philippine Exposition Board for its exhibits at the Louisiana Purchase Exposition, St. Louis, Mo., 1904.

Grand premium for representative exhibit in forestry department.
Grand premium for collaboration in forestry exhibit.
Gold medal for exhibit of timber-testing laboratory in forestry department.
Silver medal for exhibit of forest products.
Silver medal for exhibit of gums and resins.
Silver medal for exhibit of furniture made by workshop of bureau of forestry.
Silver medal for exhibit in manufacturers' department.
Silver medal for exhibit of marine craft used by the natives of the Philippine Islands.
Bronze medal for exhibit of native nipa shack and Philippine architecture.
Honorable mention for collaboration in the department of importations.

In accordance with the recommendation of this bureau, as stated in the last annual report, the workshop was transferred, on September 30, 1904, to the bureau of prisons. The timber-testing laboratory, although still under the control of this bureau, was removed to its new quarters in Bilibid prison on March 31, 1905.

The large collection of wood specimens displayed in the workshop was transferred to the main office of the bureau, where they may be seen by visitors interested in the forest resources of the islands.

A large collection of Philippine bejuco or rattan, as well as gums, resins, wood oils, charcoal, etc., has been made. As far as possible these products will be exhibited in original packages and labeled with all information available and useful to persons interested in these products.

Samples of wood and minor products are always furnished, where it is believed that such distributions will benefit the islands.

The revenue from bejucos during the last half of the fiscal year 1904–5 amounted to about ₱12,500. The one hundred or more varieties of native bejucos comprise several varieties which should sell well in the United States. Several sets have been sent to the United States, including a set sent to the Philadelphia Commercial Museum. These sets are accompanied by data, giving notes as to prices, whether scarce or abundant, uses, etc.

Forest maps have been made of all provinces in the islands. Copies of these maps are sent to all forest officers, with instructions to correct and add to these maps as they become better acquainted with the forest districts under their control.

The new forest act and regulations of last year continue to give satisfaction. A few changes in the same, however, will be recommended in the near future.

PERSONNEL.

The civil-service examinations in the United States, with the cooperation of the United States Forest Service, have secured for us during the past year 4 foresters, 4 assistant foresters, and 1 nurseryman This will make, with the 3 older foresters, a total of 11 technically-trained men available for field work. There is immediate need in the islands for double that number of men.

During the year the bureau lost, by resignation, its efficient assistant chief, Ralph C. Bryant, who was in charge of the division of forest management, and who had accomplished such valuable work in his division.

The clerical force in the main office has been reduced to a minimum. This force includes 7 Americans and 16 Filipinos. The Filipino clerks are improving in the knowledge of their duties and take interest in their work, and, without exception, take up some English studies after office hours. Six are taking the course in the

commercial night school. There is indeed a bright future for a country whose young men, after a hard day's work, take upon themselves voluntarily so many hours of study at home and in school.

The following changes have taken place during the year ending August 31, 1905: Probational appointments, 24; promotions, 23; temporary appointments, 2; transfers to bureau, 4; resignations, 27; transfers from bureau, 13; removals 18, and appointment (reinstatement), 1.

DIVISION OF INSPECTION.

In this division there are at present employed 3 inspectors, 6 assistant inspectors, 104 rangers, and 6 clerks.

During the year this division established a more uniform system of inspection of forest stations, municipalities, sitios, and barrios. The work of inspecting and appraising forest products was accomplished more expeditiously and satisfactorily. The metric system was used during the year by the employees of the bureau.

The following changes in forest stations have been made:

Stations established.

Manila (substation)		Apr. 8, 1905
Bongabon	Mindoro	July 15, 1905
Moron	Bataán	Aug. 24, 1905

Stations merged.

Salasa	Pangasinán, with Dagupan, Pangasinán	Mar. 1, 1905
Bangued	Abra, with Vigan, Ilocos Sur	Mar, 28, 1905
Cavite	Cavite with Manila (substation)	Apr. 8, 1905
Malabón	Rizal with Manila (substation)	Apr. 22, 1905
Goa	Camarines, with Nueva Cáceres, Camarines	Apr. 14, 1905
Clavería	Cagayán, with Aparri, Cagayán	July 10, 1905

At present there are 56 forest stations throughout the archipelago.

PRIVATE WOODLANDS.

In accordance with section 24 of the forest act there were registered in this bureau during the year 14 private woodland estates, having a total area of 35,772 hectares. Up to date, 146 registrations of private holdings have been made, aggregating an area of 142,708 hectares.

PRESENT METHOD OF COLLECTING FOREST CHARGES.

At the present time forest charges are collected by municipal and provincial treasurers, and in Manila by the city assessor and collector on orders of payment issued by forest officers.

PROPOSED METHOD OF COLLECTING FOREST CHARGES.

The internal revenue act of 1904 provides that taxes on forest products shall be paid in the manner prescribed in Article III of said act.

If timber cutters are required to make out the invoices and keep the registers, as prescribed in that article, it is believed that many of them would surrender their licenses. This would interfere, to a large extent, with the policy of the bureau, which is to place licenses in the hands of those who personally supervise logging operations. Many of them, and probably the most desirable licensees, would be unable to make out the papers above mentioned.

The Filipino with limited capital and a small logging outfit is generally not competent to comply with the paper requirements of said article, while those who could fill out the invoices and carry on the registers would be the mere traders in timber, unacquainted with the forest, and the least satisfactory licensees, so far as the important work of directing logging operations is concerned.

To simplify the paper work required, this office has prepared drafts of two kinds of manifests, one for timber and one for minor products. The body of the manifest is practically the same as those in use at present, but there is attached thereto a stub, to which stamps may be affixed in much the same manner as to the invoice used by

the bureau of internal revenue. These drafts of manifests have been submitted to and approved by the bureau of internal revenue. The licensees are familiar with our forms of manifest, and a few slight changes could be readily comprehended.

In the event that the above proposed manifests are adopted, the forms which are in use in this division may be continued in use, and as the method of appraisement is the same as that now in vogue, the present personnel, which has had considerable training in this work, could carry on same without confusion or interruption.

To the few licensees who are competent to classify and appraise their timber, a pad of the proposed manifests may be furnished, so that they may be able to manifest their products in the absence of the local forest officer.

TIMBER-TESTING LABORATORY.

During the past year the work of the timber-testing laboratory has been confined almost entirely to the investigation of the most important commercial woods in the Manila market.

In August, 1904, a series of tests was started, which had for its object the thorough investigation of the 37 most important woods. Four by 4-inch beams, with a 5-foot span, were adopted for cross bending, and the tests were carefully planned in order to avoid waste of material and to obtain reliable data concerning the properties of the important woods with the least possible delay.

Almost all of the material for testing has been bought in the Manila market. Great care was exercised, however, in selecting the timber, and all timber which was bought well represented its species in the market. Hereafter timber for testing will, as far as possible, be cut on the Lamao forest reserve, which will make the botanical determination absolutely certain. In addition, sylvicultural notes will accompany each set or specimens.

The majority of the pieces of each species are tested green. Some are seasoned, in order to determine the effect of the presence of moisture in the wood upon its strength. The following properties are determined for each species: 1, specific gravity of unseasoned wood; 2, specific gravity of dry wood; 3, moisture content; 4, true elastic limit; 5, apparent elastic limit; 6, modulus of rupture; 7, modulus of elasticity; 8, elastic resilience; 9, energy absorbed at apparent elastic limit; 10, energy absorbed at rupture; 11, strength in compression along the grain; 12, strength in compression across the grain; 13, strength in shearing along the grain.

The investigation of 14 species has now been completed for the present. The names of the species and the number of tests made upon each are as follows:

Common name.	Scientific name.	Tests.
1. Apitong	Dipterocarpus grandiflorus	790
2. Betis	Illipe betis	172
3. Dungon	Tarrietia sylvatica	192
4. Guijo	Shorea guiso	530
5. Ipil	Afzelia bijuga	390
6. Lauan	Anisoptera thurifera	730
7. Linsin	Parinarium griffithianum	46
8. Molave	Vitex littoralis	697
9. Narra	Pterocarpus indicus	91
10. Sacat	Terminalia nitens	64
11. Supa	Sindora wallichiana	425
12. Tanguile	Dipterocarpus polyspermus	366
13. Tindalo	Pahudia rhomboidea	90
14. Yacal	Hopea plagata	765
		5,365

Under investigation.

1. Acle	Pithecolobium acle	
2. Amuguis	Koordersiodendron pinnatum	
3. Bansalaguin	Minusops elengi	
4. Batitinan	Lagerstroemia batitinan	
5. Calantas	Cedrela toona	
6. Macaasin	Jambosa sp	
7. Malasantol	Sandoricum vidalli	
8. Malugay	Dracontomelum sp	

This leaves 15 species still to be investigated. Timber is being cut at Lamao for these tests, and during the following year the series will be completed.

Only a brief summary of results is given here, as a bulletin is being prepared which will contain a detailed report on the method of making tests, with complete charts and tables of results.

Summary of principal results.

[The modulus of rupture and strength in compression are for unseasoned timber.]

Name.	Specific gravity dry.	Modulus of rupture per square inch.	Modulus of elasticity per square inch.	Strength in compression along the grain per square inch.
		Pounds.	*Pounds.*	*Pounds.*
Apitong	0.63	7,000	1,858,000	4,300
Betis	.857	11,200	1,655,000	6,500
Dungon	.87	13,800	2,000,000	6,600
Guijo	.70	12,000	2,017,000	6,000
Ipil	.793	7,700	1,372,000	5,700
Lauan	.44	6,800	1,500,000	3,800
Liusin	.71	11,400	1,896,000	5,200
Molave	.78	10,000	1,581,000	6,400
Narra	.56	8,500	1,547,000	5,800
Sacat	.56	7,000	1,584,000	4,500
Supa	.712	11,200	1,836,000	6,600
Tanguile	.518	9,300	1,520,000	4,900
Tindalo	.763	15,600	2,209,000	7,900
Yacal	.83	13,400	2,385,000	7,400

In the mechanical tests the methods of the United States Bureau of Forestry have been followed as far as possible, except in the case of tests in compression across the grain. For these tests the following method has been adopted, in order to separate the two stresses commonly occurring in compression across the grain. These stresses are the simple compression over the given area and the shearing and bending of the material along the edges of that area.

The standard (4 by 4 inches by 6 feet) pieces are used. The piece to be tested is laid upon the table of the machine, and the load is applied through cast-iron blocks laid across the test piece. Two tests are made upon each piece, one with an iron block 2 inches wide and one with an iron block 6 inches wide, the material under the blocks being compressed 0.6 inch, unless it shows a decided point of failure before that amount of compression is reached. If no point of failure can be detected, 0.6-inch compression is assumed arbitrarily as the point of failure.

Let W equal the load necessary to apply on the 6-inch block to produce a given deflection, and let W′ equal the load necessary to apply on the 2-inch block to produce the same deflection; then, W–W′ equals the load which would produce that deflection upon an area 4 by 4 inches by simple compression—that is, without the support usually given by the material along the edges of the area over which the load is applied; therefore $\frac{W-W'}{16}$ = the stress in pounds per square inch, which produces simple compression. For convenience, this quantity will be called "P."

Now, to determine the part of the load which goes into bending and shearing the material along the edges, consider the test with the 2-inch block.

The area under compression is 8 square inches, therefore,

8P= the part of the load which produces simple compression, and since

W′= the total load applied

W′–8P= the part of the load which bends and shears the fibers along the edges of the block, and,

$\frac{W'-8P}{8}$= the stress in pounds per linear inch which produces bending and shearing and will be called "p."

P and p are very nearly independent of the area under consideration, and may, therefore, be used in all ordinary cases of compression across the grain.

P usually increases rapidly up to about 0.075-inch deflection, where a decided yield point is found, and P is practically a constant between 0.1-inch and 0.6-inch deflection; p does not increase as rapidly as P at first, but its increase is more uniform, and at 0.6-inch compression p is usually between two and three times as great as P.

In studying the effect of moisture upon the strength of timber it is interesting to note the increase of strength of certain woods when tested dry. Lauan, for instance,

is about 75 per cent stronger when seasoned than when green. In many other woods, however, the effect of moisture is not so great. In molave, for instance, no increase in strength can be detected when seasoned. This subject will receive attention during the coming year.

In addition to the regular series of tests, a special series was undertaken to determine the moisture content of thoroughly seasoned timber. It has been the prevailing opinion that owing to the high humidity in the Philippines timber which had been thoroughly seasoned by long exposure contained a rather high percentage of moisture. Specimens were obtained and moisture content determined of 17 different woods from very old buildings about Manila. All but two pieces contained between 10 and 14 per cent of moisture, which shows that seasoned timber in the Philippines contains about the same amount of moisture as seasoned timber in the United States.

On April 1, 1905, the employees in the timber-testing laboratory were discharged, with the exception of the engineer in charge. The laboratory was moved to Bilibid prison, in order to use prison labor in the preparation of test pieces. Nearly all of the timber is now brought to the laboratory in the log, where it is sawed into proper sizes.

THE SAWMILLS OF MANILA.

There are about 40 sawmills in Manila. Of this number, 3 mills—those of John Gibson, the Philippine Lumber and Development Company, and the B. W. Cadwallader Company—are American steam mills of the best type, equipped with band saws and other modern machinery. The Manila sawmill and the mill of Tuason & San Pedro are steam mills, equipped with vertical gang saws and circular saws. The remaining mills are small concerns, which deal in logs and lumber, saw by hand, and occasionally send logs to the steam mills to be sawn.

When the steam mills were introduced it was very difficult to secure reliable native labor and competent mill men. Difficulty was also experienced in sawing the hard woods, such as betis and dungon. These difficulties have now been overcome and the mills are operating in a very satisfactory manner.

The sawing capacity of the 5 steam mills is about 2,500,000 board feet per month, while the amount of timber received per month, in logs, in Manila averages only a little over 1,000,000 feet B. M. Mills experience much difficulty in securing logs with which to fill their orders, so that their sawing is regulated largely by the quantity of logs received.

The American mill men find it very difficult to do business with the Chinamen and natives who bring timber into Manila. The latter receive a shipment of logs, and often will not sell for any price until they have had two or three weeks to investigate the market, and then, if they find the market short, are likely to advance the price 50 or 60 per cent. To make themselves independent of the slow business methods in vogue, the three American mill managers are considering the feasibility of establishing a depository for logs of the most common species. They will then be able to ship timber into Manila in excess of running requirements, and buy in the local market only when timber is plentiful. It is obvious that such a depository would be of great benefit to the American mills, as expensive shut downs would cease. It would also tend to regulate the shipments of timber and would reduce the present great fluctuations in price.

At the Manila sawmill and the mill of Tuason & San Pedro all sawing is done by circular saws and vertical gang saws. The lumber produced is of first-class quality, and these mills are competing successfully with the American mills, even though they lack many of the labor-saving devices possessed by the latter.

More than half the timber brought into Manila is in the form of square logs, and it is those logs that give the mill men the most trouble, for most of them are quite dry and are much more difficult to saw for this reason.

The amount of sawing done by the hand mills has gradually decreased since the introduction of the steam mills, until at present very little lumber is being thus sawn for the market, the steam mills being able to saw at one-third to one-half the cost at which sawing can be done by hand.

The number of small hand mills and the volume of business done by them has not been affected by the operation of the large American mills, but the nature of their business has changed. The sawing is now a minor consideration, the purchase and sale of logs and lumber and contracting now comprising the more profitable part of their business.

The cost of sawing the native hard woods varies according to the hardness, toughness, and character of fiber of the wood. The price for sawing varies from $6.50 to $20 gold per thousand feet B. M.

WHITE ANTS (ANAY).

Small blocks of lauan and apitong, prepared by the bureau of government laboratories, were placed near a nest of white ants at the timber-testing laboratory on April 25, 1904; location in sandy soil, near the Pasig River. On June 9, 1904, the blocks were examined and all were found to be in good condition. They were replaced and examined again on March 28, 1905, when their condition was found to be as follows:

Set No. 1.—Saturated with ½ per cent of a solution of naphtholene in benzole: Lauan, badly decayed and slightly attached by white ants. Apitong, slightly decayed, but not attacked by the white ants.

Set No. 2.—Saturated with 1 per cent of zinc sulphate in water: Lauan, badly decayed; not attacked by the white ants. Apitong, slightly decayed; not attacked by the white ants.

Set No. 3.—Treated with $\frac{1}{100}$ solution of bichloride of mercury: Lauan, in excellent condition; not attacked by the white ants. Apitong, in excellent condition; not attacked by the white ants.

Set No. 4.—Untreated: Lauan, badly decayed and badly attacked by the white ants. Apitong, slightly decayed; not attacked by the white ants.

The United States Forest Service has forwarded to this bureau 108 pieces of Pacific coast timbers for the purpose of testing their resisting qualities in the Philippine Islands to decay and the attack of the white ant.

These specimens comprise ten of the most important United States timbers, viz, red fir, western hemlock, spruce, white spruce, lodgepole pine, California redwood, sugar pine, white pine, cedar, and mountain pine. These specimens were secured from various sawmills in the Western States from California to Montana.

They were divided into three sets. One set was untreated and the other two sets were treated with creosote and a solution of mercuric chloride, respectively.

The specimens were planted, as per instructions, near Station No. 2, on the Lamao Forest Reserve on July 5, 1905. A report on the results of this test will be made some time during the coming year.

DIVISION OF FOREST MANAGEMENT.

The work carried on by this division during the year has been the examination of forest areas, and of the work of licensees, the selection of trees for felling by marking, gathering data for forest maps, and studies of minor forest products.

Among the changes which have been effected are the abolishment of "marking," which had been in vogue for some two years, and during which time large quantities of timber in the various forest districts had been selected for felling.

Various reports show that timber marking, as regards forest conditions following cutting, has met with fair success, especially on areas where the composition of the stand would otherwise allow the lumbermen to make too severe selections.

For the following reasons it has been found impracticable to continue "marking" under present conditions:

1. The field force available is insufficient to properly cover cutting areas.
2. The rapidity of tree growth, or induration of the bark and fungus growths, soon obliterate the marks and render such trees indistinguishable from ordinary blazes made by lumbermen.
3. When species marked are widely distributed through the forest, which is frequently the case where better classes are desired, marked trees are found again with difficulty, and, in many cases, search is futile.
4. Concessioners, especially in provinces far from the market, have been averse to the marking system, as it requires them to exercise more care in lumbering. They claim that the proportion of better classes selected to those of inferior ones leaves but little profit.

In lieu of marking trees, there has been adopted a more thorough and systematic method of inspection of cutting areas.

The important requirements for concessioners to observe and follow are given in the accompanying form of report. These reports are submitted by forest officers after the inspection of cuttings. Each cutting is inspected at least twice each year, while the more important ones are visited more frequently. A careful record is kept of the operations of each licensee and reference is made to this record when application is made for renewal of license.

The number of applicants for licenses to cut timber and to gather minor forest products continues to be in excess of the amount that can be safely granted. Conditions being equal, preference is always given to persons living in the town where the license is solicited. Licensees who have neglected to give proper supervision to

their cuttings, and who have lumbered in a wasteful manner, are refused renewal of license.

The study of lumbering methods and cost of exploitation has been given attention and from such data more practical rules are formulated.

In many cases lumbering methods which have been in vogue since early times are still followed, with scarcely any improvement. This refers especially to the small operators. A tendency is shown, however, among the more intelligent, where capital is at hand, to introduce modern logging appliances. Such improvements are always encouraged and their introduction will result in diminished waste in lumbering.

The form following is printed in both the Spanish and the English languages.

[B. F. Form 33.]

REPORT ON THE OPERATIONS OF TIMBER LICENSEES.

Name of licensee ——— ——— Number —— Date granted ——— Amount granted ——— cubic meters. Province ——— { Municipality / Settlement } ——— { Barrio, / Sitio } ——— Location of forest ——— Members of party ——— ——— Date inspected ———, 190 —

1. What first and second group trees is licensee logging ———. (Name in order of amount felled.)

2. What first and lower group trees appear to be reproducing well, and under what conditions? How can this reproduction be aided in any particular species? ———.

3. What cutting rules have been furnished him, and how does he comply with them? ———.

4. Do you find any fault in the actual felling and disposal of the trees? ———.

5. What is licensee's private mark? ———. Is it registered at Forest Station and is it placed on timber before leaving sitio? ———.

6. Does he cut outside of the area granted? ———.

7. Is there any other party cutting timber within the area granted; and if so, has he reported to proper forest officers? ———.

8. State briefly the damage resulting from lumbering. ———.

9. What instructions has licensee for disposition of tops, and how are they complied with? ———.

10. Describe equipment used in lumbering and if it is sufficient to operate over the area granted? ———.

11. What natural destructive influences are present, and what are their effects on tree growth? ———.

Suggest means of improvement? ———.

12. What minor forest products of commercial value are found on above cutting area, and to what extent are they gathered? ———.

13. Character of licensee ———.

14. Does licensee visit the forest? ———.

15. Remarks. (General forest conditions of area and intensity of operations, destruction, etc.) ———.

——— ———.
(Signature.)

——— ———.
(Title.)

In addition, special cutting rules are written on the back of the license of each concessioner, and are applicable to the area granted, specifying the amount of timber of certain groups that shall be removed. In general, such rules concern woods of the first group only.

The great variety of tree species usually found on one area—many of which are valuable, but have not as yet found their way into the general market—renders the problem of management more complex than where one has to deal with forests of practically pure stands.

Heretofore the demands for the market have been fixed on certain well-known species, and attempts to introduce new, and frequently better classes, have met with loss, or, at the best, with but little profit.

Local provincial requirements have shown the superior quality of certain species, which, owing to their use in small quantities, have not become generally known. Of these species, Sasalit (*Vitex* sp.) is a fair example, as it yields a timber superior in some respects to molave (*Vitex littoralis*). During the past year Sasalit has found its way into Manila market in small quantities and has been favorably received.

Such industries as match-making, which has been introduced into Manila, and the manufacture of paper, for which the prospects are encouraging, will require large quantities of the softer, more inferior species, of which there is an abundance.

It is evident that the removal of many such species will be both beneficial to sylviculture and facilitate the exploitation of the forests.

MAPS.

The importance and necessity for reliable forest maps has been felt for some time, and data are being gathered for the completion of those on hand. Such maps are intended to cover the areas of the various forest districts and show as accurately as possible the following points:

Outline of the forest, with proportion of forest area, cultivated lands, and open or semiopen areas.

Location of various cutting sites or those suitable for such.

Logging roads and trails and waterways suitable for lumbering purposes.

As a supplement to these maps, reports of investigations of forest areas have been submitted, describing topographical features, forest conditions, abundance and condition of important component species, with notes on past and present lumbering.

The forest officers of each district are furnished copies of maps, as corrections are made, for their reference and for annotations.

PHOTOGRAPHS.

As a valuable adjunct to maps and reports, photographs have been secured covering various phases of forests and forestry. The collection to date comprises more than 750 views under the following subjects: Forest views, general views, gutta-percha and minor products, timber exploitation, tree characteristics, and transportation.

In addition, photographs relating to forestry have been secured from Java, India, United States, etc.

FOREST TYPES.

An attempt has been made to classify various forest areas according to types or zones. For descriptive purpose we may divide the forests into four natural types or zones:

1, Littoral; 2, paludal; 3, monticoline or hill type; 4, crestline or summit.

1. The littoral type constitutes that part of the forest which is touched or influenced by salt water, which is the determining factor, limiting its distribution and causing it to be the most constant as regards species. Littoral forests, owing to their location and composition, are important land builders, catching débris and mud that is constantly washed down the rivers.

Common genera included in this type are Bruguiera, Rhizophera, Heritiera, Pandanus, and Nipa.

The type is important in that it furnishes the greater portion of firewood for the islands, largely from the various species of Bruguiera. Nipa, which occurs only on this type, is one of the important products, furnishing roofing material and various "vinos."

2. The paludal type includes forests of small extent, whose distribution is determined by the presence of fresh water swamps and rivers above the tide flow. Among the most important species occurring are varieties of the heavier canes.

3. The monticoline or hill type is by far the most important, from a forestry standpoint, and is the one largely exploited for commercial purposes. The lower limits of this type vary greatly, according to physiographical conditions or aspect. In places its lower limits approach sea level, while again it recedes far inland. Probably the greater number of species of which the forests are composed are comprised in this type, and especially those of the markets.

4. Concerning the crestline type but little is known and its forests are seldom exploited. It is important in that a number of genera common to the Temperate Zone are found here. Among these are Pinus and Quercus. At these altitudes the humus accumulates to a certain extent, and among the undergrowth are found species of Fragaria and Vaccinium.

In general the work accomplished by this division during the year shows a steady advancement, especially in the collection of valuable data covering various phases of the forest and its resources and the application of such to their further development along rational lines.

LICENSES.

The granting of licenses and the logging operations of licensees continues under the supervision of the division of forest management.

At the beginning of last fiscal year the number of forms of licenses were reduced to three—ordinary, gratuitous, and miners' ordinary timber license.

Ordinary licenses are granted for the cutting, collecting, and removing from the public forests and forest reserves of forest products, on which the full charges prescribed in the forest act are due. The name of the product to be utilized is filled in the blank space, viz, ordinary timber license, ordinary firewood license, etc.

Gratuitous licenses are granted for the cutting, collecting, and removing of forest products from public forests and forest reserves free of charge. The kind of gratuitous license is filled in the blank space, thus: Public works gratuitous license, needy resident gratuitous license, etc.

Miners' ordinary licenses are granted for the cutting, collecting, and removing of timber from the public forests or forest reserves for use in developing mines.

In addition, there is a form for a license agreement which provides for the exclusive privilege of cutting, collecting, and removing of forest products for periods of not to exceed twenty years over large areas of public forest land.

During the past fiscal year bejuco was added to those forest products on which a Government charge is collected, so that at present licenses are issued for the following: Timber, firewood, charcoal, tan bark, dye bark, dyewoods, gums, resins, vegetable oils, bejuco, stone, and earth.

The method of receiving applications and granting licenses is practically the same as last year. At the beginning of this fiscal year (July 1, 1905), in addition to the authority to grant ordinary and gratuitous licenses for amounts not exceeding 13 cubic meters, and firewood licenses, the forest officers in charge of forest districts were authorized to grant licenses for all the minor forest products. In view of the importance of the fishing industry of these islands and of the large number of fish traps used, these forest officers were also authorized to grant ordinary timber licenses for fish traps for amounts not to exceed 50 cubic meters of wood of the third and fourth groups and gratuitous timber licenses for fish traps for amounts not to exceed 20 cubic meters of wood of the fourth group.

A great deal of delay is saved by having these forest officers grant minor product licenses in the provinces.

Applications for timber licenses for amounts exceeding 13 cubic meters are still acted upon by the Manila office after the local forest officer or district chief has examined the site applied for and has made his recommendation.

During the fiscal year there has been but one license agreement made, which was entered into with the Insular Lumber Company (a company incorporated in the United States), and it granted the privilege to exploit a large tract of timber land (about 60 square miles in area) in northern Negros Occidental for a term of twenty years.

It is expected that more license agreements for a long term of years will be made during the coming year. One license agreement for a company to operate in Mindoro is at present awaiting final approval.

A periodical report, showing the logging operations, etc., of each licensee is submitted by the forest officers in charge of their districts. This report is filed with each licensee's application, together with a record of any infractions committed. These data are very valuable in granting renewals of licenses.

Owing to the poverty and unsettled conditions of the provinces of Iloilo and Sámar, the governors of these provinces were given authority to grant gratuitous licenses to needy residents for amounts not to exceed 13 cubic meters.

Similar authorities to grant gratuitous licenses in the provinces of Surigao and Misamis and the subprovince of Catanduanes have been issued to the rangers in charge of these provinces.

The same authority has been issued for the benefit of nine municipalities that had been visited by storms or fires, or on account of the poverty of their inhabitants.

There is attached hereto a statement showing the number of licenses granted during the fiscal year ending June 30, 1905, also a list of licensees who have been granted amounts of 1,000 cubic meters of timber or over, together with the amount cut by them during the fiscal year.

List of licenses granted during the fiscal year 1904–5.

Province.	Timber.		Gratuitous.		Firewood.		By-products.	Total.
	By bureau.	By subordinates.	By bureau.	By subordinates.	By bureau.	By subordinates.		
Abra	40	1	27	.....	7	4	4	83
Albay	47	1	4	.....	17	6	6	81
Antique	6	3	2	14	.....	2	.....	27
Bataán	22	6	7	13	1	24	6	79
Batangas	11	.....	1	.....	.....	12	.....	24
Benguet	16	4	7	.....	.....	1	.....	28
Bohol	12	18	29	9	.....	11	.....	79
Bulacán	27	5	11	27	1	10	14	95
Cagayán	31	20	10	3	.....	11	20	95
Camarines	47	44	11	69	4	33	22	230
Cápiz	36	35	7	15	.....	22	1	116
Cavite	4	.....	2	.....	19	.....	.....	25
Cebú	8	2	3	1	.....	7	.....	21
Ilocos Norte	88	.....	139	.....	3	.....	.....	230
Ilocos Sur	40	1	23	.....	5	1	1	71
Iloílo	29	16	5	68	.....	57	25	200
Isabela	8	.....	9	.....	.....	.....	.....	17
Laguna	26	.....	12	1	15	.....	5	59
Leyte	25	22	18	11	3	15	5	99
Lepanto-Bontoc	48	.....	23	.....	.....	.....	.....	71
Masbate	20	70	10	28	.....	20	42	190
Mindoro	38	2	2	8	1	32	31	114
Miasmis	28	.....	8	.....	1	.....	1	38
Moro	101	.....	29	.....	23	.....	39	192
Negros Occidental	67	46	5	30	2	110	42	302
Negros Oriental	11	24	5	4	.....	15	.....	59
Nueva Ecija	17	18	7	5	.....	4	6	57
Nueva Vizcaya	.....	.....	1	.....	.....	.....	.....	1
Pampanga	19	13	7	1	.....	33	.....	73
Pangasinán	39	45	18	23	3	38	16	182
Paragua	13	.....	3	.....	3	.....	26	45
Rizal	16	.....	25	.....	21	1	6	69
Romblón	20	.....	16	.....	1	.....	12	49
Sámar	49	3	6	4	6	10	3	81
Sorsogón	25	.....	6	.....	6	.....	1	38
Surigao	33	1	6	18	.....	4	6	68
Tárlac	19	18	5	2	.....	25	1	70
Tayabas	43	60	14	56	1	54	24	252
Unión	23	4	9	.....	2	2	.....	40
Zambales	25	12	10	7	1	17	29	101
Total	1,177	494	542	417	146	581	394	3,751

Amount of timber cut during 1904–5 by licensees granted 1,000 cubic meters or more.

Licensees.	Location.	Amount granted.	Amount cut.
		Cub. meters.	*Cub. meters.*
The Insular Lumber Co	Cadiz Nuevo and Sagay, Negros Occidental.	[a] Unlimited	2,019
Alvisse Lumber and Development Co.	Pinamalayan, Mindoro	1,200	[b] 1,985
Benguet Commercial Co	Baguio, Benguet	3,000	1,960
Evangelista, Claro	Guinayangan, Tayabas	1,500	1,497
Compañía Maderera de Luzón	do	2,000	1,474
Philippine Lumber and Development Co.	San Fernando, Camarines	2,164	1,471
Barber, C. A	Pinamalayan, Mindoro	1,200	1,010
Gerena & Co	Calauag, Tayabas	1,000	966
Beebe & Lyon Co	Zamboanga, Moro	2,000	928
Calvo & Co	Ragay, Camarines	1,300	908
Tolentine, Felix	Guinayangan, Tayabas	1,000	888
Carballo, German	Escalante, Negros Occidental	1,000	888
Nichols, J. Clayton	do	1,000	810
Atlantic, Gulf and Pacific Co	Moran, Bagac and Mariveles Bataán.	1,500	276
Diamond Lumber and Development Co.	Puerto Galera, Mindoro	1,000	188
Lagdameo, Ramón	Guinayangan, Tayabas	1,000	180

[a] License agreement.

[b] 785 cubic meters excess.

CLEARINGS OR FOREST OPENINGS.

Factors regulating the presence and distribution of the forests of any country are, to a great degree, geographical location and physiographical features, which, in turn, largely determine the climate. The results of these determining influences, however, are everywhere more or less modified by the interference of man.

In the Philippine Islands it is a difficult matter to conjecture just what portion of the area has been at one time covered by forest, and to what extent the interference of wandering tribes has modified its outlines. It is safe to say, however, that lands at present under forest cover have never to any extent been under cultivation, and that a great portion of the open or semiopen lands existing to-day were formerly well wooded.

In considering the extensive grass lands found in many provinces, it is not improbable that they have been the gradual result of fires which have been set annually from remote times and have forced the forest to recede year by year.

In certain of these open areas one is led to believe that, owing to the geological formation as influencing the character of the soil, forests—if formerly occurring—were of an open nature.

GENERAL CONDITIONS.

For purposes of description we may define three distinct types of land, including cultivated areas, open or semiopen grass lands, and forested areas.

The relative proportion of these three areas varies appreciably, according to physiographical features, in so far as they influence soil formation and soil character. For example, some provinces are almost covered with pure forests, while in others we find nearly all the area appropriated for agricultural purposes, with scarcely any amount of waste land.

As a rule, the agricultural lands occupy the fertile river valleys and adjacent slopes; the open grass lands the more rocky, steep slopes, while the remainder, which is forested, covers the mountainous portion.

However, as formerly stated, the present forest outlines are largely modified by the interference of man, and in sparsely populated places many lowlands suitable for agriculture are still under forest cover.

CAUSES LEADING TO CLEARING.

By far the greatest destructive agents of forests are clearings which have largely followed severe thinnings made on lumbered areas. In certain instances such thinnings are made with a view of subsequently clearing the land, whereby the greater part of the merchantable timber is utilized, the remaining growing stock is destroyed by slashing and finally burned.

Owing to the moist conditions favoring the rapid decay of humus, forest fires are unable to spread through the virgin stand, but are confined to the dry slashings. In locating places for clearing good soil is naturally sought, and hence the best stands usually suffer.

DAMAGE.

The damage wrought, aside from the actual destruction and nonuse of the timber and growing stock, is partially compensated, according to the purpose for which such clearings are made, whether the soil is more valuable for agricultural purposes than for forest purposes; distance from the market and means of transportation; whether arable waste land is available; character of crops grown and whether held permanently under cultivation or abandoned after one or two seasons.

In cases where no intermediary waste land is available and suitable for purposes desired, and where crops of a permanent character, such as cocoanut, abacá, maguey, etc., are to be grown, it will be necessary that forest areas be cleared.

By far the greater damage is wrought by transitory clearings, such as are planted in mountain rice, corn, and camotes.

Sufficient quantities of land can not be denied these people when used within the bounds of reasonable economy. However, thousands of acres are cleared annually for the mere purpose of growing one or two crops, after which the greater portion is abandoned. Such cases as these require immediate attention, and the persons accustomed to these practices are of the less law-abiding, more ignorant classes, and consequently are harder to deal with.

SEASON OF MAKING.

In the majority of cases, clearings are made during the early part of the dry season, when the newly-felled timber rapidly becomes dry and renders burning an easy matter. The clearing season varies somewhat, according to locality, but is usually during March, April, and May.

On the approach of the rainy season, or early in June, the cleared areas are planted and seldom require further attention until they are harvested.

Where cereals are planted small houses are frequently located on the clearing, where the owner lives until his crop is gathered, after which he retires to his permanent home in an adjoining barrio.

On the advent of the following season only a small portion return to claim lands cleared the previous year. The fresher more easily worked soil of new clearings is sought instead and is usually adjacent to the one abandoned. Estimates have been made on certain cleared areas which will show in a general manner the waste ordinarily resulting.

In order to clear up and plant one acre with mountain rice the labor of one man is required for about three months, which, at 30 cents per day, amounts to ₱27.

When clearings are made on lands that have been culled over by lumbermen, where not more than one-half of the merchantable stand has been removed, there yet remains to be cleared at least 1,000 cubic feet of timber, which, at 15 cents stumpage, amounts to ₱150.

The yield of rice, which is varied and uncertain, may be taken to average 20 cavans per acre, and, rated at ₱1 per cavan, represents in value ₱20.

Thus we find in addition to the total loss of timber destroyed there remains an additional loss over value of crops grown to labor expended in growing.

In case the land is early abandoned no estimate has been made to cover loss of growing stock in addition to value of timber destroyed.

In certain localities or provinces, where the land is adaptable to growing cocoanuts, abacá, or other crops of a permanent nature, estimates show that clearings are usually justifiable, and lands are more profitable under cultivation than in forest. Such lands will be kept under cultivation and will continue to yield good profits year after year.

ABANDONED.

Clearings which are abandoned after one year's planting are found to contain a certain number of stumps with vegetative properties still potent; the soil is loose and more receptive to seeding than of those having been planted for two or three seasons. Also a certain quantity of seeds that have fallen before the land was cleared may retain their vitality, both of which tend to furnish a fairly good growth toward reforesting. Natural reforesting by means of coppice alone, however, can not be depended upon to any extent, since many of the better tree species either do not sprout again from stumps or, if they do, rarely attain mature tree size. Nevertheless the protection afforded the site by such as possess this power is useful in preventing rapid surface evaporation and conditions favoring the entrance of cogon. If, however, the area is continued under cultivation for at least two seasons no volunteer reproduction remains, the soil becomes dry and baked, and is seldom receptive to any seeds which may fall.

The latter state favors the entrance of cogon (*Imperata arundinacea*), a tall perennial grass well adapted to such conditions. Cogon areas are encountered on the upper mountain slopes of Bataán, occurring as open patches of small extent through the heavily wooded forests. These areas are no doubt abandoned clearings, which were made by Negritos and were held under cultivation for several years, being of a more permanent character than many others. Crops are guarded from wild pigs and deer by crude bamboo fences.

Burns-Murdoch, conservator of forests of the federated Malay states, writing of lalang (*Imperata cylindrica*), a closely related species of cogon, says:

"Cleared land in this country if not kept constantly clean becomes covered with lalang (*I. cylindrica*), the thetke grass of Burma, but this grass here grows with such strength as to prevent young trees from taking hold. It is liable to fires and is benefited by them, so much so that in large lalang wastes that are regularly burnt over, it is doubtful if natural reafforestation would ever occur. The cost of regular plantations is increased enormously owing to the necessity of most thorough clearing."

In reclaiming cogon land for agricultural purposes two methods are pursued:

The bureau of agriculture has found that by plowing the land and sowing with velvet beans cogon is effectually killed in one season at cost averaging $3.60 gold per acre.

By native methods at least three or four plowings are required, at an expense of from ₱6 to ₱8 per acre.

NATURAL REFORESTING OF CLEARED LANDS.

A study of natural reforesting of cleared areas presents an interesting example of nature's methods and shows the comparative ability of various species to endure light or, more properly, drought.

The most successful examples of natural reforesting, because they are better protected from fire and other harmful influences, are found on the smaller isolated areas throughout the forests. The following specific example will be cited as one of several ways by which natural reforesting takes place.

In effecting the transition back from clearings to high forest, the initial step is taken by a small woody plant, *Cupao-cupao* (sp.). This plant is one of the very few that can endure extended drought, and not only grows well among the cogon, which it gradually replaces, but is seldom killed by fire. After establishing itself well and affording a certain amount of shade, which conserves small amounts of moisture, we find conditions which will permit the entrance of Bayabas (*Psidium guayava*) and Alalangad (*Albizzia* sp.), either of which are trees of the open or semi-open, and are intermediary in effecting steps from open grass lands back to forest cover.

An important and valuable characteristic of Bayabas is that it will reproduce vegetatively, and is thereby of service where the parched soil prevents the germination of seeds.

Clearings having become well set with the light-demanding species, such as those noted above, pave the way for the better forest species and gradually partake of a nature peculiar to the surrounding forest.

In the Remban district of the Malay States, Tembusa (*Fagræa fragrans*) is one of the few trees which is able to grow on Lalang or cogon areas, which it soon conquers.

FIRES ON GRASS LANDS.

Under the caption of "Clearings" may properly be included the destructive influence of fires, which annually—or more frequently—sweep over the open grass lands. These fires are usually confined to the dry months of March, April, and May, and during the rainy season, which immediately follows, there springs up tender grass suitable for grazing. At this season deer are attracted to the open and are more easily hunted. Such fires are usually started by hunters, who have held the custom from remote times. Owing to the rapidity with which these fires travel, driven before the wind, and the difficulty of finding the author this practice remains a hard one to overcome.

Recent experiments by the bureau of government laboratories show that cogon will furnish good paper material, and in the event of its extensive use for such purposes doubtless the natives, with view to reaping profit therefrom, will protect these areas from fire.

While it would be of advantage to place fires under control on all areas, it is especially important to do so where the grass lands terminate abruptly at the edge of high forest, where each succeeding fire causes them to recede.

During each rainy season a certain amount of tree growth springs up on the grass lands. Some of the more hardy species survive, but the majority succumb to drought or are killed by succeeding fires.

Many rocky slopes are naturally seeded with molave (*Vitex littoralis*). This species is moderately drought-enduring, and, were it not killed by fire, would no doubt spread gradually over considerable areas.

CONTROL.

The control of artificial clearings, such as usually follow excessive cuttings, has been found much more simple than that of the firing of the open grass lands, and there is little doubt that the latter causes less direct damage to the forests.

The forest service of India, in dealing with much the same conditions as exist here, has found the problem of fire protection to be one of the most difficult with which it has to contend. The people were taught that injury to the forest was an offense. Large areas were formerly destroyed by fire and ax in order to gather a few uncertain crops of cereals. The grazing question, with which they had to deal—and one which is important in many countries—need scarcely be considered here. India has found that a gradual introduction of strict protective measures has resulted in less friction than when the question has been attacked abruptly.

The question of influence of forests in conserving the water supply, while being an important one, can not be so grave as is experienced in countries whose climate allows the accumulation of a thick humus to cover the forest floor and where rainfall is less abundant.

The warm climate and continued moisture of these islands promote rapid decomposition of the forest litter, so that the small quantities that are allowed to accumu-

e conserve an insignificant quantity of water.

The question of erosion is an important one, not only regarding its influence on future forest growth, but from its bearing on agricultural soils of the low lands. Beyond the considerable benefit which the dense cover of tropical forests affords, by dissipating the force of heavy seasonal rains—wherever such may occur—and by retarding subsequent rapid evaporation, factors largely determining or regulating the "flow-off," are topographical, and the character of the soil of the broad forested slopes, with their deep soil, even though practically void of humus, collect and conserve immense quantities of water during the rainy seasons, gradually releasing it during the succeeding dry months.

For the latter reasons, largely, this bureau has adopted the policy of conservative selection in lumbering.

One would naturally expect that the grass-covered areas would be of great value in retarding erosion, and such would be the case were they not burned over during the dry months just prior to the rainy season, which exposes those areas to the beating rains.

The question of forest protection is one that stands among the foremost in a forest policy, and among the various conditions studied, from which to draw conclusions, the status of the people, whom it most concerns, is not the least important.

In formulating satisfactory protective measures, the conditions which have led to such a necessity must be well considered.

The wasteful custom of making clearings in these islands is deeply rooted, and is one that has been practiced for years with scarcely any restraint. Very satisfactory results are ensuing from making arrests, which seems to be the most effective way of solving the problem. During the past two years many arrests have been made, which has resulted in an appreciable decrease in the making of clearings.

The field force has been insufficient, however, to properly cover the ground, and, owing to the fact that considerable time must elapse between visits of forest officers in certain towns, it would be of advantage to have presidents of towns and their tenientes delegated as fire wardens.

In addition, timber concessioners, who are held responsible for the condition of their cutting areas, can be of much service by not only reporting attempts of clearings of their respective areas, but of adjacent areas, and such service rendered should be considered favorably on renewal of licenses.

As a preliminary step toward control of clearings by fire, forms of permit have been devised (Form No. 4) and are granted by forest officers and forest agents of the various districts, in accordance with the forest act.

Upon receipt of an application (Form No. 2) to make a clearing, the forest officer makes an examination of the tract desired, and, if found more valuable for agricultural than for forest purposes, a permit is given. Such permits do not confer the right of ownership, unless the right to homestead is applied for, according to the public-land act, and its conditions complied with.

The following statement shows the number of permits that have been granted from date of first permit, in March, 1905, to June 30, 1905:

On public lands, with an area of 752.31 hectares:	
By forest officers	185
By municipal presidents	284
Total	469
On private lands, with an area of 1,535.75 hectares:	
By forest officers	298
By municipal presidents	235
Total	533

[B. F., FORM 2.]

DEPARTMENT OF THE INTERIOR, BUREAU OF FORESTRY,
DIVISION OF INSPECTION,
Manila, ———, *190–*.

APPLICATION FOR PERMIT TO MAKE CAIÑGIN.

To forest officer or municipal president:

SIR: In accordance with Forest Regulation XXV, I have the honor to apply for permission to make a caiñgin on { public / my private } land, situated in the sitio of ———,

barrio of ———, municipality or settlement of ———, province of ———; said cainĝin to be ——— meters long and ——— meters wide, and to have an area of ——— ares. Name of product to be sown or planted ———.

I will be responsible for damage done to adjoining forests by this cainĝin, and will assist in extinguishing any forest fires that may occur therein from any cause.

(1) Said land is covered by trees of the following inferior species: ———, which are not at present nor will in future be of more value for timber or firewood than the land cleared will be for agricultural purposes.

(2) Said land is covered by the following tree species: ———.

(2) Evidence of ownership of the above-mentioned land is as follows: ———.

Very respectfully,

———.
(Applicant.)
———.
(Address.)

NOTE.—Paragraph (1) will be filled out when the clearing is to be made on public land and paragraph (2) when on private land.

REMARKS BY FOREST OFFICER.

The above land is covered with ———.
Signs of reproduction ———.
Other remarks ———.
Granted or denied the ——— day of ———, 190–.

———.
(Signature.)

This application should be in triplicate when made to a municipal president (one copy for municipal president, one for local forest station, and one for Manila office) and in duplicate when made to a forest officer (one copy for forest station and one for Manila office).

[B. F., FORM. 4.]

DEPARTMENT OF THE INTERIOR, BUREAU OF FORESTRY,
DIVISION OF INSPECTION,
Manila, ———, *190–*.

PERMIT TO MAKE CAINĜIN.

In accordance with Forest Regulation XXV, permission is hereby granted ———, resident of ———, to make a cainĝin ——— meters long and ——— meters wide, having an area of ——— acres, in the sitio of ———, barrio of ———, municipality or settlement of ———, province of ———.

The party aforesaid agrees to be responsible for damage, if any, done to adjoining forests by this cainĝin, and to assist in extinguishing any fires that may occur therein from any other cause.

———.
Forest Officer or Municipal President.

APPLICATIONS FOR CERTIFICATION OF AGRICULTURAL CHARACTER OF PUBLIC LANDS APPLIED FOR AS HOMESTEADS, FOR SALE OR FOR LEASE.

In accordance with the public land act (No. 926) public lands shall not be sold, entered, or leased until a certificate is secured from the bureau of forestry that the land is more valuable for agricultural than for forest purposes.

One hundred and thirty-three applications for the homesteading and sale of public lands have been referred to this bureau by the bureau of public lands. The first certificate for the above purpose was made to the bureau of public lands on August 5, 1904.

When a request for this certification is applied for by the bureau of public lands, the description and area of the land mentioned is referred to the local forest officer, who inspects the land and submits his report on the attached form. The certificate above mentioned is usually based on this report. Occasionally an inspection by a second forest officer is made when additional information, or a check on a former report, is required.

The following table shows the certifications made during the fiscal year ending June 30, 1905:

Province.	Homestead.			Sale.			Grand total.
	Certified as more valuable for—		Total number applications.	Certified as more valuable for—		Total number applications.	
	Agricultural purposes.	Forest purposes.		Agricultural purposes.	Forest purposes.		
Abra	6	.....	6	.....	.....	.....	6
Albay	1	.....	1	.....	.....	.....	1
Cagayán	4	.....	4	3	.....	3	7
Ilocos Norte	8	2	10	.....	.....	.....	10
Laguna	22	1	23	.....	.....	.....	23
Leyte	1	.....	1	.....	.....	.....	1
Masbate	4	1	5	.....	.....	.....	5
Mindoro	1	2	3	2	.....	2	5
Negros Oriental	3	.....	3	.....	.....	.....	3
Rizal	1	.....	1	1	.....	1	2
Tárlac	21	.....	21	.....	.....	.....	21
Tayabas	4	.....	4	.....	.....	.....	4
Unión	1	.....	1	2	.....	2	3
Zambales	3	.....	3	.....	.....	.....	3
Grand total	80	6	86	8	.....	8	94

No applications for the lease of public lands have been received.

[B. F. FORM No. 5.]

REPORT ON PUBLIC LANDS.

Name of applicant ——— ———; post-office address ———; for locality, description, and area of land see reverse side.

(In answering the following questions draw a line through the words not needed.) Homestead. Lease. Purchase. Slope of land: Level; moderate; steep; very steep. Exposure: North; south; east; west. Soil: Clay; sandy loam; sand. Character of soil cover: Cultivated, grass land, brush land, brush land and timber mixed, dense forest. If cultivated, state crops being grown ———. State most important timber species on tract ———. State what portion of tract is wooded ———. Is this tract of land more valuable for agricultural than for forest purposes? (State reasons in full for answer made) ———. For growth of what agricultural product is this land suitable? ———. If the land is covered with valuable timber, state whether there is public land as suitable for agriculture in vicinity which is not covered with valuable timber ———. Remarks ———.

——— ———,
Forest Officer.

Date inspected ———.

DEPARTMENT OF THE INTERIOR,
BUREAU OF FORESTRY,
Manila, P. I., ———, ——.

———,
———.

SIR: You are directed to examine the parcel of land described below as soon as possible.

After examination, you will fill out the blanks and answer the questions on the reverse side of this sheet, returning same to this bureau.

Very respectfully,

——— ———.

THE LAMAO FOREST RESERVE.

The survey of the Lamao forest reserve, together with a map showing the metes and bounds, was completed by an employee of this bureau in January of this year. The map, description of the reserve and other data were forwarded to the governor general, and the lands within the reserve were, on February 9, 1905, in accordance

with Act No. 648, Philippine Commission, certified by him to the court of land registration, as reserved for the use of the government of the Philippine Islands.

During the period March 10 to 28, 1905, all persons claiming land (or possessions) within the limits of the reserve, were notified by the court of land registration, in accordance with Acts Nos. 648 and 627, Philippine Commission, that the land had been reserved for public use and that all title deeds to any lands or possessions within the same must be presented to the court of land registration for adjudication and registration within six calendar months from date of the receipt of the notification. Notices to this effect were also posted at various places throughout the reserve.

Up to date but one claim for land within the reserve has been presented to the court for registration. This claim is for a tract of land about 26 acres in area.

In addition to the survey of the metes and bounds of the reserve, a topographical contour map (scale $\frac{1}{10000}$) has been made, showing trails, rivers, cultivated areas, and locations of the 3 nurseries.

A preliminary survey was also made for a proposed road from the second to the third station. The road will be 6 miles in length. The maximum grade will be about 10 per cent. There is a difference of elevation of 2,070 feet between the second and third stations.

Mr. Thomas Richmond, in charge of the nurseries on the reserve, was sent in September of last year to visit and report on the botanic gardens at Ceylon, Singapore, and Hongkong. His report included a map and description of each garden, also the method of recording species, arrangement of plants, construction of plant houses, kinds of labels used, methods of recording the history of seeds and plants received, the system of arrangement of plants and care of the same, and many other valuable data which will be of use at Lamao.

Mr. Richmond was compelled, on account of ill health, to resign his position in October, and returned to the United States. Mr. Sherlock took charge of the work until June of this year, when Mr. Thomas Hanley, in addition to his work as landscape gardener, was placed in charge of the entire work on the reserve.

A graduate of the Agricultural College of Minnesota is expected to arrive from the United States in the near future. He will be placed in charge of the nursery work on the reserve.

Since the establishment of the reserve, it has been the desire of the bureau to induce the Negritos who live in the near-by mountains to take up their residence on the reserve, assuring them protection from the Filipinos and adequate wages in return for their labor.

This plan is meeting with some success. Eight families or groups of Negritos have taken up their residence near the second station. They are employed in various ways and work very satisfactorily, especially when employed as packers or clearing up the jungle.

Each man is given a metal tag and a certificate to the effect that he is under the protection of the Philippine government.

Several neat little nipa houses have been built by them, following a plan of the undersigned as to size, location, etc. It is hoped that in a short while others will appreciate the advantage of living there and will join the present small band.

There are several hundred Negritos living in the mountains in southern Bataán, and it is hoped that we can induce at least 150 to form a small model village near the second station. Such a village would contain about 50 men. Twenty-five or thirty of these men would always find employment at 25 centavos each per day, thus allowing the balance of the men to hunt, gather forest products, and trade in the near-by towns on the coast. It is the intention of the undersigned to assign to the village a tract of fertile land, where they may plant rice, camotes, bananas, etc., at the same time giving them such assistance in the way of seeds, plants, implements, etc., with instructions as to their use, that their work may result favorably.

During the past year the grounds about the first station have been cleared, drives laid out, lawns made, and a large number of plants set out. A propagating house, 25 by 45 feet, covered with a nipa roof, was constructed, and also a house of the same dimensions for the care of orchids, ferns, and other plants.

A system of recording the history of all seeds and plants received has been adopted. All plants have zinc or wooden labels. The number on the label can be readily found in the records, where full information, as above noted, may be found.

Authority has been received to sell the surplus plants, and from present indications a fairly large trade will be opened up in the near future throughout the islands. A number of orders have been received, including one for ₱900 worth of ornamental plants for Fort McKinley.

At the third station a house has been constructed, grounds cleared, and a large number of fruit trees and other plants from the Temperate Zone have been planted.

Seeds of pine from the provinces of Benguet and Zambales have germinated at this station, and the seedlings are doing well. In addition to the nursery work at this station, Mr. Meyer, who is in charge, is looking after three large type areas, and is also collecting botanical material.

Mr. H. N. Whitford, the botanist of the bureau of government laboratories, who was in charge of the botanical survey of the reserve, has almost completed his investigation along the lines mentioned in the last report of this bureau. The results will be published in the near future as a bulletin of the bureau of government laboratories. Mr. Whitford refers to his work as follows:

"A botanical survey of the Lamao forest reserve was undertaken to present a description of the Philippine forests that would give quantitative results on the composition of the forests, and show the relations of the different types to the climatic and physiographic conditions in which they grow. The reserve comprises approximately 11,000 acres, and extends from sea level to 4,500 feet. While its topographic diversity is typical of that of the more accessible forested regions of the islands, it does not contain the broad coastal plains and the wide river valleys of the cultivated portions.

"Some thirty-four plots were selected and carefully studied. The plots vary from one-half to 5 acres in size, and were made in different physiographic situations at all altitudes. In each plot all trees over 16 feet in height were noted, and sterile and fertile specimens of those that could not be determined in the field were collected. In this way, the systematic composition of the forest was determined. A tabulation of these results give the actual stand of each type. A partial summary of one plot will give an idea of the work.

"The plot, situated on a slope at 1,100 feet altitude, has an approximate area of 5 acres, and contains some 1,160 trees, comprising 87 species. Of the principal timber trees, 182, or 15½ per cent, are Dipterocarpus grandiflorus Blanco (*apitong*); 134, or 11½ per cent, Shorea polysperma Blanco (Merr.), (*tanguile*); 59, or 5 per cent, Diospyros pilosanthera Blanco (*bolongeta*); 46, or 4 per cent, Calophyllum wallichianum Pl. et Tr. (*palo maría del monte*), and 12, or 1 per cent, Shorea guiso (Blanco) Blume.

"In a plot on a similar slope, at an altitude of 400 feet, the composition of the forest is very different, and in a river bottom adjoining this it is again different. In each plot notes were made on the ecological habits of the mature trees, seedlings, and other plants.

"In connection with the work, and with the aid of bureau of forestry employees, temperature, rainfall, and relative humidity readings were obtained at sea level, at 130 and at 2,200 feet, and less complete data at 2,800, 3,000, 3,400, and 3,800 feet. While these data cover only a short period of time, yet they were taken simultaneously at the different stations and show climatic differences that will to some extent account for the difference in the forest types at these altitudes. Since at the same altitude plots were made in the different topographic situations, a clue is given to the effect of physiography on the vegetation. With the detailed plots as a basis, a map is in the process of construction that will show the extent of the different forests on other vegetational 'stands' that are on the reserve."

SEED AND PLANT EXCHANGE LIST.

The following is a copy of the seed and plant exchange list of this bureau: Mr. O. Bartels, Brisbane, Australia; Forest Department, Sydney, Australia; Botanic Gardens, Port Darwin, Australia; Woods and Forests Department, Perth, Australia; Mr. L. Cockayne, Island Bay, Wellington, New Zealand; Director of Agriculture, Zanzibar, German East Africa; Imperial Biological Agricultural Institute, Amani, Port Tanga, German East Africa; Botanic Gardens, Aburi, near Accra, Gold Coast, Africa; Botanical Gardens, Durban, Natal, South Africa; Botanic Gardens, Sierra Leone, West Africa; Mr. A. Robertson-Proschowsky, St. Helene, Nice, France; Station Agriculture di Missoloughi, Athens, Greece; Jardin Botanique, St. Denis, Reunion; Mr. S. P. Chatterjee, Victoria Nursery, Calcutta, India; Biharilal's Garden, Howbagh, Jubulpore, India; Mysore Botanic Garden, Bangalore, Mysore, India; Royal Botanic Gardens, Sibpur, near Calcutta, India; Botanical Gardens, Saharanpur, provinces of Agra and Oudh, India; Royal Botanic Gardens, Peradeniya, Ceylon; Experimental Stations, Selangor, Federated Malay States; Botanic Gardens, Penang, Straits Settlements; Botanic Gardens, Singapore, Straits Settlements; Botanic Gardens, Buitenzorg, Java; Director of Agriculture, Forests, and Commerce, Hanoi, Cochin China; Jardin Botanique, Saigon, Cochin China; Botanic Gardens, Hongkong, China; Agricultural Experiment Station, Agaña, Guam; Agricultural Experiment Station, Honolulu, Hawaii; Board of Agriculture and Forestry, Honolulu, Hawaii; Museo Parense de Historia Natural, Para, Brazil; Botanic Gardens, Sao

Paulo, Brazil; Department of Agriculture for West Indies, Bridgetown, Barbados; Mr. Newton B. Pierce, Santa Ana, Cal.; Dr. David Fairchild, agricultural explorer, Washington, D. C.; Shaw Botanical Gardens, St. Louis, Mo.; Botanic Gardens, Port of Spain, Trinidad; Botanical Gardens, Kingstown, Jamaica.

Many interesting and valuable plants have been received from a large number on this list, and nearly all have offered to enter into a system of mutual exchange of seeds and plants. As the nurseries at the Lamao forest reserve are still very young, few seeds and plants have been sent in exchange for those received. Botanical collectors have found a number of new, interesting, and valuable plants on the reserve, the seeds of which are much sought after.

Seeds and plants have been purchased from the following firms: Damman & Co., Naples, Italy; William Brothers, Heneratgoda, Ceylon; F. Hamilton Brunning, Melbourne, Australia; Yokohama Nursery Company, Yokohama, Japan; Trumbull & Beebe, San Francisco, Cal.; California Nursery Company, Niles, Cal.

GEORGE P. AHERN,
Captain, Ninth U. S. Infantry, Chief, Bureau of Forestry.

The SECRETARY OF THE INTERIOR,
Manila, P. I.

Quantities of forest products taken from public and private lands of the Philippine Islands during the fiscal year July 1, 1904, to June 30, 1905.

Province.	Timber (maderas).	Firewood (leñas).	Charcoal (carbon).	Dyewood (sibucao).	Tanbark (casalote).	Dyebark (nigue).	Dammar, gum copal (almaciga).	Guttapercha (gutapercha).	Breas, resins, balsam, and allied products.
	Cubic meters.	*Cubic meters.*	*Cubic meters.*	*M. qq.*	*M. qq.*	*M. qq.*	*M. qq.*	*M. qq.*	*M. qq.*
Albay	4,375.53	2,252	.....	.....	.....	.....	.....	.....	.....
Antique	121.61	1,012	.....	.....	20.41	.....	.....	.....	.....
Bataán	6,910.72	26,241	520	.....	2.86	.....	.....	.....	.....
Batangas	797.61	2,964	.....	.....	58.51	.....	.....	.....	.....
Benguet	2,424.66	10	.....	.....	.....	.....	.....	.....	.....
Bohol	1,996.89	1,576	.....	.....	3.62	.....	.....	.....	.....
Bulacán	6,115.88	8,030	1,920	.....	11.25	.....	88.46	.....	.....
Cagayán	4,649.94	1,382	.....	.....	593.25	.....	.....	.....	.....
Camarines	8,517.02	11,774	4	.....	.....	.....	27.12	.....	15.96
Cápiz	1,054.86	5,283	5	.....	.....	.....	.....	.....	.....
Cavite	16.33	5,113	.....	.....	2.35	.....	.....	.....	.....
Cebú	1,116.63	1,129	.....	.....	125.79	.....	.....	.....	2.50
Ilocos, North	1,439.00	76	.....	.....	.....	.....	.....	.....	.....
Ilocos, South	2,387.21	3,964	.....	.....	.....	.....	.....	.....	.....
Iloilo	2,332.91	54,332	148	22,840.00	54.48	.....	1.00	.....	.....
Isabela	1,326.85	.....	.....	.....	.....	.....	.....	.....	.....
Laguna	3,900.94	17,505	76	.....	.....	.....	.....	.....	.....
Lepanto-Bontoc	299.15	1	.....	.....	.90	.....	.....	.....	.....
Leyte	7,971.33	9,809	.....	.....	62.59	.....	.....	.....	.....
Masbate	2,536.10	7,549	.....	.....	697.19	4.58	.....	.....	303.56
Mindoro	6,983.45	6,510	28	.....	3,502.63	187.00	.....	.....	10.00
Misamis	458.77	152	.....	.....	.....	.....	.....	.....	.....
Moro	6,215.02	11,177	.....	.....	4,036.62	.....	1,105.00	29.25	5,368.00
Negros Occidental	10,304.47	36,078	.....	15.00	385.04	.....	2.00	.....	.....
Negros Oriental	938.61	2,307	.....	.....	.....	.....	.....	.....	.....
Nueva Ecija	1,023.53	2,170	.....	.....	.....	.....	22.44	.....	.....
Nueva Vizcaya	11.22	.....	.....	.....	.....	.....	.....	.....	.....
Pampanga	1,345.54	40,935	608	.....	.....	.....	.....	.....	.....
Pangasinán	3,141.86	10,131	170	.....	114.24	.....	.....	.....	.....
Paragua	2,901.84	1,069	.....	.....	2,140.62	.....	589.24	.....	220.25
Rizal	1,218.75	20,244	.....	.....	14.51	.....	.....	.....	.....
Romblón	1,297.56	14	.....	.....	.....	.....	123.58	.....	.....
Sámar	2,666.22	3,999	.....	.....	523.29	.....	.....	.....	.....
Sorsogón	2,893.34	2,241	.....	.....	.....	.....	.....	.....	.....
Surigao	1,794.82	2,178	.....	.....	295.97	.....	.....	.....	.....
Tárlac	1,340.01	7,862	12	.....	.....	.....	10.48	.....	.....
Tayabas	14,486.06	16,183	1	.....	77.41	9.97	53.33	.....	188.08
Unión	922.75	471	.....	.....	.....	.....	.....	.....	.....
Zambales	4,236.83	2,038	2,569	.....	.....	.72	25.35	.....	.....
Total	124,471.32	320,711	6,061	22,855.00	12,723.58	202.22	1,942.90	29.25	6,127.30

NOTE.—One metric quintal equals 220.46 pounds (Av.). One cubic meter equals 35,315 cubic feet (English).

Rattan (bejuco) is sold in following sizes: Whole or round bejuco, 12 to 18 feet long by ¼ to 1 inch diameter. Split bejuco, 5 to 16 feet long by $\frac{1}{16}$ to ¾ inch diameter.

Quantities of forest products taken from public and private lands of the Philippine Islands during the fiscal year July 1, 1904, to June 30, 1905.

Province.	Oils, panao, wood oil (lumbang).	Rattan (bejuco).	Stakes for fish corrals (estacas).	Gratuitous.		Private estates.			
				Timber.	Firewood.	Timber.	Firewood.	Charcoal.	Tanbark.
	Liters.	*Number of pieces.*	*Cubic meters.*	*Cubic meters.*	*Cubic meters.*	*Cubic meters.*	*Cubic meters.*	*Cubic meters.*	*M. qq.*
Albay		810,600							
Antique		156,300	3	45.75					
Bataán		871,975		134.50					
Batangas		10,800				148.04	1,228	12	0.72
Benguet				152.05					
Bohol				33.32					
Bulacán		8,033,500		137.80			5,751		
Cagayán		940,500		505.25					
Camarines		7,097,190		153.07	275				
Cápiz		49,450		122.12	236	13.68	203		
Cavite									
Cebú	240	30,000		24.01					
Ilocos North				686.80					
Ilocos South		16,300		283.76		1.92			
Iloílo		163,000		56.77	7,244				
Isabela		323		41.71		18.48			
Laguna		143,060		37.31	332	4.00	135		
Lepanto-Bontoc				106.88					
Leyte	3,639	1,045,831		145.22	626	32.42			
Masbate		2,036,500		27.19		1.93			
Mindoro		777,838		1,432.09					
Misamis		539,100		80.50					
Moro		1,514,983		87.44		79.35			
Negros Occidental	36,137	10,431,770		542.31	194	2,207.19			
Negros Oriental	1	853,934		98.84					
Nueva Ecija		416,450		470.60		451.80	1		
Nueva Vizcaya				14.12					
Pampanga				92.70		8.22	31,380	1,170	
Pangasinán		323,390		452.24	2,818	79.96			
Paragua	33	722,250		58.38					
Rizal		2,077,400		67.94		83.99	5,816		
Romblón	2,538								
Sámar	1,080	542,330		627.78	152				
Sorsogón		44,100		43.36					
Surigao	295	403,403		437.63					
Tárlac		12,775		193.94		3,056.15	1,085		
Tayabas		1,388,110	56	332.05					
Unión		700		206.67					
Zambales		663,375	33	558.65					
Total	43,963	42,117,237	92	8,492.25	11,877	6,185.20	45,599	1,182	.72

Quantity and species of timber cut from July 1, 1904, to June 30, 1905, on which Government charges have been collected.

FIRST GROUP.

Common name.	Scientific name.	Quantity.
		Cubic meters.
Acle	Pithecolobium acle	669.86
Baticulin	Litsea perrottetii	482.89
Betis	Illipe betis	574.00
Camagon	Diospyros discolor	88.67
Ebony	Maba buxifolia	96.85
Ipil	Afzelia bijuga	4,423.06
Lanete	Wrightia ovata	106.54
Mancono	Xanthostemon verdugonianus	134.16
Molave	Vitex littoralis	6,637.28
Narra	Pterocarpus indicus	4,881.21
Tindalo	Pahudia rhomboidea	816.82
Yacal	Hopea plagata	3,924.39
Total		22,235.23

Quantities and species of timber cut from July 1, 1904, to June 30, 1905, on which Government charges have been collected.

SECOND GROUP.

Common name.	Scientific name.	Quantity.
		Cubic meters.
Alupag	Euphoria cinerea	147.44
Aranga	Homalium luzoniense	757.69
Banaba	Lagerstroemia speciosa	777.27
Bansalaguin	Mimusops elengi	362.15
Banuyo	Dipterocarpus sp	391.80
Batitinan	Lagerstroemia batitinan	449.74
Bolongeta	Diospyros pilosanthera	231.60
Calamansanay	Terminalia calamansanai	527.18
Calantas	Cedrela toona	785.43
Dungon	Tarrietia sylvatica	1,650.93
Guijo	Shorea guiso	10,209.41
Macaasin	Jambosa sp	1,623.48
Malacadios	Myristica sp	129.21
Mangachapuy	Vatica mangachapoi	952.96
Palo María	Calophyllum inophyllum	613.31
Supa	Sindora wallichiana	1,306.62
Teak	Tectona grandis	200.28
Tucan-calao	Sterculia sp	227.88
Total		21,344.38

THIRD GROUP.

Agoho	Casuarina equisetifolia	70.52
Amuguis	Koordersiodendron pinnatum	1,346.82
Anubing	Artocarpus cumingiana	386.02
Apitong	Dipterocarpus grandiflorus	8,945.42
Batino	Alstonia macrophylla	115.47
Bitanhol	Scolopia	178.69
Catmon	Dillenia philippinensis	200.25
Calumpit	Terminalia edulia	449.03
Cupang	Parkia roxburghii	729.65
Dalinsi	Terminalia catappa	278.13
Dita	Alstonia scholaris	213.14
Dungon-late	Heritiera littoralis	154.68
Malacmalac	Palaquium sp	159.25
Malapapaya	Polyscias sp	1,084.36
Malasantol	Sandoricum vidalii	211.14
Mayapis	Anisoptera vidaliana	1,420.50
Nato	Sterculia sp	389.15
Palosapis	Shorea sp	394.46
Panao	Dipterocarpus vernicifluus	346.01
Sacat	Terminalia nitens	383.79
Santol	Sandoricum indicum	85.62
Tamayuan	Gymnosporia ambigua	405.05
Tanguile	Dipterocarpus polyspermus	3,107.58
Total		21,404.68

FOURTH GROUP.

Anahao	Livistonia merrillii	349.26
Anam	Buchanania florida	271.27
Apuit	?	270.51
Bacao	Rhizophora mucronata	3,692.27
Balacat	Zizyphus zonulatus	479.96
Balinhasay	Buchanania florida	283.34
Batete	Cynometra sp	357.17
Bayoc	Pterospermum diversifolium	253.76
Bonga	Bauhinia sp	7.30
Bulao	Canarium sp	96.83
Lauan	Anisoptera thurifera	20,140.85
Malaanonang	Shorea malaanonan	426.49
Malabalac	?	31.71
Malabonga	Iteadaphne sp	216.86
Mangasinoro	Shorea sp	1,909.75
Manicnic	Palaquium tenuipetiolatum	909.12
Pagatpat	Sonneratia pagatpat	1,422.45
Pagsainguin	Canarium sp	79.86
Total		30,696.77
Nonenumerated species		28,890.26
Total		59,487.03

RECAPITULATION.

	Cubic meters.
First group	22,235.23
Second group	21,844.38
Third group	21,404.68
Fourth group	59,487.03
Total	124,471.32

List of most important Philippine woods received in the market during the five preceding years, arranged in order of quantity.

No.	Tree species.	Relative order in fiscal year.					Amount cut during fiscal year 1904–5.	Total amount cut during the five years.
		1900–1901.	1901–2.	1902–3.	1903–4.	1904–5.		
							Cubic meters.	*Cubic meters.*
1	Lauan	1	1	1	1	1	20,140.85	85,576.82
2	Apitong	4	2	2	2	3	8,945.42	49,208.94
3	Guijo	2	4	3	3	2	10,209.41	39,558.98
4	Molave	10	3	4	4	4	6,637.28	30,027.85
5	Yacal	15	7	5	5	7	3,924.39	19,737.27
6	Narra	13	5	6	6	6	4,331.21	16,738.67
7	Tanguile	20	6	7	8	9	3,107.53	13,396.09
8	Ipil	26	12	8	7	5	4,423.06	13,347.79
9	Dungon	5	9	11	9	10	1,650.93	9,094.69
10	Bacao	30	10	37	11	8	3,692.27	7,745.58
11	Macaasin	6	25	10	12	11	1,623.48	6,930.33
12	Supa	7	8	15	33	13	1,306.62	6,323.86
13	Sacat	12	11	9	20	30	383.79	6,272.84
14	Calantas	11	15	16	10	17	785.43	6,082.00
15	Malasantol	3	14	12	21	11	211.14	5,814.82
16	Amuguis	17	32	17	15	12	1,246.82	4,931.54
17	Tindalo	22	19	13	14	16	816.82	5,067.10
18	Balacat	8	13	14	24	24	479.93	4,856.02
19	Mangachapuy	24	20	24	17	14	952.96	4,407.45
20	Acle	34	24	20	16	21	669.86	4,140.82
21	Palo María	36	29	23	13	22	613.31	3,709.24
22	Malabonga	19	18	26	19	35	216.88	3,540.30
23	Betis	33	21	22	26	23	574.00	3,326.44
24	Palosapis	25	17	28	22	28	394.46	3,202.33
25	Balinhasay	21	23	21	30	34	238.34	3,209.00
26	Banaba	37	33	27	18	18	777.27	3,157.04
27	Calumpit	23	34	19	28	26	449.03	3,143.48
28	Nato	27	22	31	31	15	839.15	3,088.77
29	Malaanonang	35	16	18	37	27	426.49	3,038.11
30	Panao	9	36	32	27	32	346.01	2,753.47
31	Bansalaguin	14	35	25	32	31	362.15	2,742.90
32	Cupang	28	30	30	34	20	729.65	2,598.40
33	Aranga	31	31	36	25	19	757.69	2,568.21
34	Dalinsi	18	27	29	35	33	278.18	2,584.75
35	Malabalac	16	26	35	36	37	81.71	2,149.78
36	Batitinan	32	28	34	29	25	449.74	2,143.92
37	Banuyo	29	37	33	23	29	391.80	2,102.78

Statement of government charges collected on forest products during the fiscal year 1904–5.

	Philippine currency.		Philippine currency.
1904.			
July	₱23,633.38	February	₱27,900.73
August	20,158.35	March	35,563.99
September	23,051.13	April	29,365.90
October	28,675.48	May	88,017.12
November	24,324.02	June	39,988.69
December	35,475.27	Total	346,015.69
1905.			
January	24,911.63		

The total revenue, as found by the auditor for the Philippine Islands, amounts to ₱343,300.08. The difference in the two totals is due to refunds, difference in rate of exchange, etc.

Source of revenue by products during fiscal year 1904–5.

Product.	Amount utilized.	Revenue.
Timber ..... cubic meters..	124,471.32	₱269,596.29
Firewood ..... do....	320,711.00	45,928.24
Charcoal ..... do....	6,061.00	2,522.66
Dyewood ..... metric quintals..	22,855.00	3,060.32
Tan bark ..... do....	12,723.53	6,076.10
Gum-mastic (almaciga) ..... do....	1,942.90	1,825.74
Gutta-percha ..... do....	29.25	498.08
Resins (breas) ..... do....	6,127.30	5,744.35
Wood oils ..... liters..	43,963.00	450.27
Rattan (bejuco) ..... pieces..	42,117,237	12,344.74
Stakes ..... cubic meters..	92.00	92.12
Dye bark ..... metric quintals..	202.22	71.79
Stone and earth	.....	325.61
Total		348,536.31

NOTE.—Of the above amount, ₱2,520.62 was pending collection by the provincial treasurers at the end of the fiscal year.

Comparative statement of government charges collected on forest products, and of the expenditures of the bureau of forestry for the past five fiscal years.

Year.	Goverment charges collected.	Expenditures of forestry bureau.
1900–1901	[a] $199,373.11	[a] $42,654.21
1901–2	[a] 348,073.06	[a] 155,289.78
1902–3	[a] 527,414.85	[c] 96,202.36
1903–4	[a] 599,480.56	[b] ₱304,863.87
1904–5	[b] ₱343,300.06	[b] ₱282,796.77

[a] Mexican currency. [b] Philippine currency. [c] United States currency.

Expenditures, July 1, 1904, to June 30, 1905.

Salaries and wages:		
Appropriation 1904—		
For services of employees		₱2,989.89
For hire of labor		171.85
Appropriation 1905—		
For services of employees		194,179.08
For hire of labor		7,526.58
		204,867.40
Transportation:		
Appropriation 1904—		
For traveling expenses of employees		3,661.23
For official transportation		209.57
For purchase of supplies		2,777.60
Total transportation		6,648.40
Contingent expenses:		
Appropriation 1904—		
For office and laboratory rent		19.33
For miscellaneous supplies		5,776.71
For purchase of plants and seeds for Lamao		103.53
For wood samples and timber for testing		291.00
Appropriation 1905—		
For office and laboratory rent		2,876.57
For traveling expenses of employees		22,069.07
For official transportation		1,647.37
For repairs to launch *Philadelphia*		4,102.88

Contingent expenses—Continued.	
Appropriation 1905—Continued.	
For purchase of seeds and plants for Lamao	676.96
For purchase of wood samples and timber for testing	1,118.75
For purchase of miscellaneous supplies and repairs	13,333.00
Total contingent expenses	52,015.17
For printing and binding	19,264.80

SUMMARY.

The total expenditures during the period commencing July 1, 1904, and ending June 30, 1905, are as follows, viz:

From appropriation fiscal year 1904.

Salaries and wages	₱3,161.74
Transportation	6,648.40
Contingent expenses	6,190.57
Total	16,000.71

From appropriation fiscal year 1905.

Salaries and wages	₱201,705.66
Contingent expenses	45,824.60
Total	247,530.26
Printing and binding	19,264.80
Grand total of all expenditures for the year	282,795.77

Importation of timber and lumber into the Philippine Islands during fiscal year ending June 30, 1905.

Logs and other timber, dutiable	feet B. M.	3,394,010
Boards, deals, planks, etc., free entry	do	23,082,000
Lumber, Government, free entry	do	3,203,634
Timber, Government, free entry	pieces	9,261

Freight rates (approximate) on timber and lumber.—Manila to United States (Pacific coast), $20 United States currency per M feet B. M., or $8 United States currency per ton (40 cubic feet). United States (Pacific coast) to Manila, $10 to $12 United States currency per M feet B. M.

Value of native woods most commonly used (per 1,000 feet B. M.).

[Newspaper quotations on native timber in Manila market, August, 1903–September, 1905.]

[Prices in U. S. currency.]

	Aug., 1903.	Aug. 10, 1904.	Apr. 24, 1905.	Sept. 8, 1905.	Price for sawing.	Government charge, Class B provinces.
Lauan	$37.50	$37.50	$50.00	$55.00	$6.50	$0.75
Apitong	50.00	45.00	65.00	60.00	7.50	1.50
Guijo	85.00	70.00	75.00	65.00	7.50	2.25
Molave	140.00	160.00	175.00	150.00	11.50	3.75
Yacal	120.00	125.00	100.00	100.00	11.50	.....
Narra, red	.....	150.00	125.00	150.00	11.50	.....
Narra, white	.....	120.00	100.00	125.00	11.50	.....
Ipil	120.00	125.00	90.00	100.00	11.50	.....
Supa	.....	90.00	80.00	90.00	11.50	.....
Amuguis	60.00	83.00	55.00	55.00	7.50	.....
Nato	.....	45.00	.....	50.00	.....	.....
Tanguile	.....	.....	.....	50.00	.....	.....

According to the statistics in this office a larger quantity of the first four woods in the foregoing list was received in the market than the total for the next forty species, taken from a list of woods arranged in order of quantity taken from the public forests.

The prices of these leading construction woods were changed by the new tariff as follows (date of change May 7, 1904):

	Old law price per Spanish cubic foot (Mexican currency).	New law price per Spanish cubic foot (Philippine currency).		Stumpage price per M. feet B. M., as understood by American lumbermen. Class B provinces (U. S. currency).
		A provinces.	B provinces.	
Lauan	$0.03	₱0.02½	₱0.01½	$0.75
Apitong	.03	.03½	.02½	1.50
Guijo	.06	.06½	.03½	2.25
Molave	.14	.11½	.05½	2.75

Comparison of prices and quotations on native timber in Manila market, August, 1903, to July, 1905.

[All prices in Philippine currency.]

	Report 1902–3, Spanish cubic feet in log.	Report 1903–4 English cubic feet in log.	January, 1905, Spanish cubic feet in log.	April, 1905, Spanish cubic feet in log.	July, 1905, Spanish cubic feet in log.	Government charges per Spanish cubic foot.	
						Old law (Mexican currency).	New law (Philippine currency).
Lauan	₱0.52	₱0.40	₱0.30	₱0.25	₱0.25–0.40	$0.03	₱0.02½–0.01½
Apitong	.66	.62	.40	.35	.30– .45	.03	.03½– .02½
Guijo	.88	.62	.50	.55	.40– .50	.06	.06½– .03½
Molave	1.50	.96	.85	.90	.80–1.05	.14	.11½– .05½
Yacal	1.40	.80	.60	.70	.50– .85	.14	.11½– .05½
Narra	1.66	.94	.80	1.00	.80–1.02	.14	.11½– .05½
Tanguile	.64	.....	.....	.....	.55– .65	.06	.06½– .03½
Sacat	.....	.50	.35	.35	.28– .30	.06	.06½– .02½
Ipil	1.36	1.00	.85	.90	.80– .90	.14	.11½– .05½
Dungon	1.44	.81	.65	.65	.55–1.00	.14	.06½– .03½
Supa	.84	.56	.55	.55	.55– .80	.06	.06½– .03½
Tindalo	1.50	1.00	.80	1.00	.80–1.00	.14	.11½– .05½
Amuguis	.70	.42	.40	.45	.35– .50	.06	.06½– .03½
Acle	1.46	.75	.90	1.00	1.00–1.25	.14	.11½– .05½

NOTE.—One cubic foot (English) equals 1.309 cubic feet (Spanish).

The woods in the above list are the 14 leading woods, arranged in order of quantity received in the market during the fiscal year 1903–4. This order has remained about the same for the past 4 years, and will be practically the same for this fiscal year.

APPENDIX I.

REPORT OF THE CHIEF OF THE MINING BUREAU.

DEPARTMENT OF THE INTERIOR,
THE MINING BUREAU,
Manila, September 15, 1905.

SIR: I have the honor to submit herewith my report as chief of the mining bureau for the year ending August 31, 1905.

BUREAU ORGANIZATION—RECOMMENDATIONS TO THE ORGANIZATION COMMITTEE.

During the past year the reorganization of the mining bureau, as provided for in Act No. 916 of the Philippine Commission, was completed by the appointment of Mr. W. D. Smith to the hitherto vacant position of geologist. This appointment was made on March 1, 1905, and was thus delayed by reason of the difficulty in finding a young man whose training fulfilled the exact qualifications desired. Mr. Smith has been especially selected to investigate the economic geology of iron, coal, and other deposits, chiefly stratified in Philippine fields and his training is such that it is hoped he will develop into a valuable man for this work.

The present bureau organization is numerically small and the field covered is necessarily wide. The men at present engaged are all of them selected by me from best available material for their work, and they have already proved themselves competent in the many duties assigned to them. By even a cursory inspection of the range of these duties an idea of the required qualifications and the training preparatory and to be acquired may be had. To those appreciating the desirability of specialization and of concentration upon given lines of work it would seem unfortunate that the bureau staff is so limited in numbers; and it would seem to the best interests of the mineral industry at this time that this force be immediately increased, that all economic deposits of probable value may be investigated and reported upon at the earliest possible time. In view of the present necessity for retrenchment in expenses on the part of the insular government, however, recommendation to this effect can not yet be made; but still less is it possible for me to recommend that the present bureau staff be curtailed in number, or that necessary field funds for future bureau expenses be decreased in amount. The mining bureau as at present organized is the result of evolution and development from plans formulated by me three years ago, and it is now attempting to cover an important work with a minimum force. It is believed that economy is being secured throughout, and no efforts are being spared to this end. All work assigned is in accordance with my best judgment as to its importance, and no part of the work now being carried on by this bureau can, in my judgment, be transferred for best results elsewhere. Notwithstanding the magnitude of its task, the work of systematic field investigation and of working up in the office notes and data gathered on the ground is being carried on with promise of definite and valuable results. Economy is practiced to what is believed to be the highest degree by the appointment of men so broadly trained that they are able to perform, under proper direction, all field and office work, from the preliminary survey to the published report. This has been the plan of the chief of this bureau since he first recommended the present reorganization and during the period of actual formative development to the organization of to-day.

In view of the above, and of additional similar considerations when the chief of this bureau was interrogated by the organization committee appointed by Executive Order No. 14, series of 1905, to report upon the efficiency of insular bureaus and to make recommendations concerning them, he strongly recommended in a special report, dated April 10, 1905, in which the purpose, work, plans, and costs of this

bureau are gone into in detail, that no reduction in force or field funds, and that no "merging" or consolidation of this with any other bureau be recommended by the committee.

The purposes and plans of this bureau, as authorized in Act No. 916, were also discussed, with quotations from this act, in the annual report for the year 1904, and it is believed that no further elaboration of them need be given here.

QUARTERS OCCUPIED BY THE MINING BUREAU.

In the report of this bureau for 1904 attention was invited to the need for more commodious quarters for this bureau, and particularly for rooms with sufficient light. The present quarters have the two distinct advantages, (1) that they are in a Government building acquired from Spain (the Casa Moneda, at 358 calle Cabildo, Intramuros), and that they are therefore of no expense to the insular government but that of repair; and (2) that they are situated in the Walled City, near the Ayuntamiento, and on one of the street-car lines. They have the great disadvantage of being poorly arranged for the purposes required, of being without sufficient light, of being too limited to accommodate present needs, and, finally, of being in need of repairs which at the present time it has not been considered advisable to recommend.

Recommendations of this bureau for 1903 and 1904 are respectfully repeated, to the effect that provision be made for the second floor of a suitable wing to be added to the new building of the government laboratories, to be set aside and properly furnished and equipped for the use of the mining bureau.

OFFICE WORK, EXECUTIVE, CORRESPONDENCE, EXCHANGES, PREPARATION OF REPORTS AND MAPS—TRANSFER OF TECHNICAL LIBRARY.

The office work of this bureau has steadily increased during the past year. The time of the chief of the bureau is mainly occupied in equipping and directing field parties, in supervising the divisions of work carried on in Manila and in the field, in securing and furnishing information concerning the mineral resources and industry, in extending assistance to those actually or prospectively engaged or interested in the development of this industry, in providing for the needs of the bureau, and in general in undertaking to carry out, with his loyal and efficient assistants, the purposes for which the bureau was organized under Act No. 916. These duties, involving much correspondence and occasional delays, and meeting at times with negative results, have been greatly lightened by the harmonious working of the bureau as a whole, by the cordial cooperation of fellow officials—municipal, provincial, and insular—and by the active support and assistance generously given by business men in Manila and elsewhere and by miners and prospectors wherever they may be found. It is a pleasure to record the natural, but by no means the obvious or necessary fact, that those whom this bureau has striven most earnestly to serve have almost invariably given it their most cordial support.

The preparation of material for reports following upon fieldwork and of special reports to the chief of the bureau, and the performance of general technical work assigned, constitute the office work of the two geologists and the two field assistants of the technical force. This preparation consists in working up all data obtained and all field material gathered, including general, geologic, economic, and topographic notes, fossils, rock, and mineral samples, illustrations, and maps. The personnel of the bureau has been so selected that the entire work required, with the exception of some photographic and all quantitative analytic chemical work, is performed as natural subdivisions of its work within the bureau. The exceptions are subdivisions of the work of the bureau of government laboratories and are efficiently performed therein upon request. The maximum economy is, it is believed, obtained under present conditions in this way. The four technical assistants are expected to confine themselves to work to which they are especially assigned, and all executive and supervisory work is undertaken by the chief of the bureau, to whom the various members of the technical force report direct. By this arrangement the geologists and field assistants have their entire time for the rather wide range of scientific, economic, and engineering work necessarily required of them, and economy is, it is believed, again subserved.

During the past year Messrs. Eveland and Smith, geologists, and Messrs. Goodman and Ickis, field assistants, have accomplished much and valuable work along the lines given above, including preparation of reports upon field work in Rizal, Pangasinán, Lepanto, Benguet, and Masbate by Mr. Eveland; upon field work in Batan, Albay, and Batangas by Mr. Smith; upon field work in Bulacán by Mr. Goodman, and upon field work in Rizal, Laguna, Bulacán, and Bataán by Mr. Ickis,

together with reports upon minor subjects assigned, and with investigations, reference, and research connected therewith.

In return for publications of this bureau a number of valuable exchanges, comprising the most important journals relating to engineering, mining, metallurgy, and geology are received. These publications are placed upon a large table in the main office of the bureau and are at the disposal of all who may require their use. Complete sets of exchanges are eventually sent to the general scientific library for file. A double reading and correspondence desk is maintained in this room especially for the accommodation of visitors, and stationery and reference material are supplied for the purpose of taking notes. This "Visitors' Desk" has been much appreciated in the past.

During the past year, by direction of the honorable the Secretary of the Interior, a general scientific library was formed by consolidation of the technical and scientific libraries of the various bureaus of the department of the interior, and was placed with the library of the bureau of government laboratories under the supervision of the superintendent of that bureau. From this bureau were accordingly transferred a comparatively small number of books obtained by purchase and a large number of valuable publications received through exchange. In order that the volumes most often required by this bureau might be at hand upon the working shelves, the withdrawal of some of these books was authorized and they are now in this bureau upon memorandum receipts. Experience since the transfer was made has led me to believe that this withdrawal under the present arrangement is essential to the most economic use of the volumes, and that it has so far been attended with satisfactory results. The obvious advantages of the consolidation of books into one scientific library for general use are (1) prevention of unnecessary duplication of books, (2) feasibility of compiling a general catalogue and keeping it to date, and (3) advantages of uniformity of methods in preservation, in purchase, and in exchange. By withdrawal upon the part of each bureau concerned of those volumes required the remainder are provided and cared for in the most economic and systematic way.

In concluding this portion of my report it is my pleasure to record that to Mr. R. C. Redmayne, chief clerk and stenographer, especial credit should be given for his efficient work throughout the year. The entire correspondence of the bureau for the past five years, the mailing addresses, catalogues, and other office material, have been filed under the card-index system by Mr. Redmayne in addition to his regular work. His duties, including the charge of all correspondence, have been many and onerous, but he has always responded promptly to every demand upon his services and has proved himself an invaluable man to the bureau.

All clerical work of this bureau is under the direct charge of Mr. Redmayne, whose only assistant is Mr. G. M. de Ubago, record and property clerk. Mr. de Ubago was first appointed to this bureau on April 2, 1900, by my honored predecessor, now Judge Charles H. Burritt, of the mountain district. Mr. de Ubago, a native of these islands, has improved upon the training received under the Spanish Government, and especially upon that given him by Judge Burritt, and has shown himself a most loyal and efficient clerk. He has learned English, has become an expert typewriter, is a fair accountant, and a good interpreter; he is prompt to respond to demands upon him, is always at work, and always on time. A more satisfactory example of the possibilities of the native clerk it is believed it would be difficult to find.

MUSEUM WORK; COLLECTIONS; PETROGRAPHIC, BLOWPIPE, AND PALEONTOLOGIC WORK; FIELD AND MEGASCOPIC CLASSIFICATION OF THE IGNEOUS ROCKS.

During the past year the rock and mineral collections of this bureau have increased by additions of samples sent in by prospectors, miners, and others interested in mines, to whom this acknowledgment of cordial appreciation is due, and by suites of samples brought back by bureau parties returning from the field.

Time has not yet been available for the recataloguing proposed of the collections by the card system, but it is planned to do this during the coming year. Opportunity will then be taken to thoroughly sort over the collections, dispensing with worthless material, storing duplicates for exchange, and rearranging the cases geographically apportioned to material not exhibited in the economic suites.

In connection with petrographic work, Mr. Eveland, geologist, has been directed to systematically arrange and catalogue all rock slides for use under the microscope, and in the paleontologic work of classifying fossils collected, Mr. Smith, geologist, has been similarly directed to provide for and catalogue all fossil material gathered, and Mr. H. M. Ickis, field assistant, has been placed in general charge of the remaining collections, and credit for their present arrangement is due to him.

The petrographic determinations of rocks, a very important division of the bureau work, has been placed under the general charge of Mr. A. J. Eveland, who is also charged with the greater portion of the economic geology of the igneous rocks. This bureau is now equipped with a microscope and accessories of the best type, and with this and his complete private petrographic library, Mr. Eveland has entered upon his highly interesting and profitable work with enthusiasm and zeal. Rock sections of samples collected by him in Benguet and Lepanto have been prepared and examined by Mr. Eveland, sections of igneous rocks from Batan Island and elsewhere have been studied by Mr. Smith, and sections of various samples requiring microscopic examination have been reported upon by Mr. Goodman during the past year. The field of investigation of the igneous rocks in the Philippines is wide and but slightly touched upon, and important results in petrographic work are expected. Future investigation of rocks under the microscope will also be made by Mr. Smith and Mr. Goodman as occasion demands.

Determinations of ores and minerals by the blowpipe have been made by Messrs. Smith, Goodman, and Ickis during the year, and have continued to prove rapid, economic, and fairly reliable in securing information desired. A large proportion of samples sent to this bureau can be readily classified by rapid blowpipe work at an insignificant cost. This work, most satisfactorily performed by men most closely associated with work in minerals, ores, and rocks, has been a valuable adjunct to this bureau for the past five years.

Paleontologic work has been begun by Mr. Smith in the classification of fossils obtained by him in his investigations of the Batan Island coal field, and will be extended over all age determinations of Philippine rocks. This work, commonly considered purely scientific, is of the highest importance in the correlation of stratified deposits and determination of continuity of beds of economic value, particularly of coal, and it will form a material portion of the special work assigned to Mr. Smith. This field has been but little worked in the past, and it is hoped that valuable results will follow upon its investigation in connection with bureau plans.

In the important matter of megascopic and field classification of rocks the greatest difficulties have presented themselves here, as elsewhere, in attempts to give a satisfactory proximate classification for the igneous rocks. Various authors, prominent among whom in American geologic work are Prof. J. F. Kemp, of Columbia University, and Prof. E. H. Williams, of Lehigh University, have prepared handbooks for the identification of rocks without the microscope. In addition to these are the highly valuable writings of G. P. Merrill, of the Smithsonian Institution; J. S. Diller, of the U. S. Geological Survey, and the text-books on geology, of Dana, Geikie, Prestwich, Le Conte, Scott, and finally of Chamberlain and Salisbury, in English, in which descriptions, largely available for use without the microscope, are given for the igneous rocks. Following upon the use of different systems of classifications, and upon a tendency only too frequent to propose new names, however, a multiplicity of rock names has grown up and a confusion of nomenclature has been the inevitable result. Modern efforts toward systematic treatment of and a greater simplicity in this matter have resulted finally in a proposed megascopic classification by the joint efforts of the eminent American petrographers, Whitman Cross, Joseph P. Iddings, Louis V. Pirsson, and Henry S. Washington, as given in their Quantitative Classification of Igneous Rocks, published in Chicago in 1904. This classification is reproduced in the most recent text-book of geology, that by Chamberlain and Salisbury, of which volume 1 was issued in 1904, with slight modification, and it has been provisionally and officially adopted by the chief of this bureau, somewhat further simplified, as apparently best serving needs for field and megascopic use. It is considered that the Philippine field is so free from preconceived prejudices and opinions in this respect that the scheme adopted should work with least friction here; and it is hoped that the simplicity and elasticity of the classification will enable all miners, prospectors, teachers, or others interested in Philippine igneous rocks to apply the system with a minimum of difficulty and with a maximum of satisfactory results.

The classification above mentioned is fully given in the following special circular No. 1, dated March 10, 1905, which was published for general use in the Official Gazette of April 26, 1905:

To the geologists and field assistants, mining bureau:

The following system for megascopic and field classification of the igneous rocks, as proposed by the eminent petrographers, Messrs. Cross, Iddings, Pirsson, and Washington, added to, with respect to the use of the word "dolerite," by Messrs. Chamberlain and Salisbury, of the University of Chicago, and modified for further simplicity by the chief of this bureau by the omission of all synonyms terminating in "-phyre," with the exception of the two retained words "melaphyre" and

"leucophyre," is hereby provisionally adopted for official use in the work of the mining bureau. The letters "f. n.," signifying field name, will be invariably written after each word of this classification used, unless a statement appears otherwise in a bulletin or report reproducing the outline herewith adopted or to the effect that the system is used as authorized and directed herein.

Every effort will be made to explain and popularize this classification, to the end that miners and others interested in the bureau work may use terms in harmony therewith.

DIVISIONS OF IGNEOUS ROCKS.

A. Phanerites are rocks whose mineral components can be seen with the unaided eye.

B. Aphanites are rocks whose mineral components can partly be seen with the unaided eye, the remaining lithoidal material being not resolvable into its component parts.

C. Glasses are rocks with vitreous luster in the whole or a part of the mass.

Division A—Phanerites.

1. Granites (f. n.) are granular igneous rocks with dominant quartz and feldspar of any kind, with mica, hornblende, or other minerals in subordinate amount.
2. Syenites (f. n.) are granular igneous rocks with dominant feldspars of any kind, with hornblende, pyroxene, mica, or other minerals, but with little or no quartz.
3. Diorites (f. n.) are granular igneous rocks with dominant hornblende and subordinate feldspar of any kind, with or without other minerals.
4. Gabbros (f. n.) are granular igneous rocks with dominant pyroxene and subordinate feldspar of any kind, with or without other minerals.
5. Dolerites (f. n.) are granular igneous rocks with any dominant ferromagnesian mineral, not megascopically determined, and subordinate feldspar of any kind, with or without other minerals.
6. Peridotites (f. n.) are granular igneous rocks composed of olivine and ferromagnesian minerals, with little or no feldspar or other minerals.
7. Pyroxenites (f. n.) are granular igneous rocks composed of pyroxene, with little or no feldspar or other minerals.
8. Hornblendites (f. n.) are granular igneous rocks composed of hornblende, with little or no feldspar or other minerals.

Division B—Aphanites.

(a) Nonporphyritic. These are divided into—
1. Felsites (f. n.), or aphanitic igneous rocks, nonporphyritic and light colored, without vitreous luster.
2. Basalts (f. n.), or aphanitic igneous rocks, nonporphyritic and dark colored.

(b) Porphyritic. These porphyries are divided, depending upon the dominant phenocryst, into—
1. Quartz-porphyry (f. n.), composed of quartz phenocrysts and aphanitic matrix.
2. Feldspar-porphyry (f. n.), composed of feldspar phenocrysts and aphanitic matrix.
3. Hornblende-porphyry (f. n.), composed of hornblende phenocrysts and aphanitic matrix.
4. Mica-porphyry (f. n.), composed of mica phenocrysts and aphanitic matrix.
5. Augite-porphyry (f. n.), composed of augite-phenocrysts and aphanitic matrix.
6. Olivine-porphyry (f. n.), composed of olivine phenocrysts and aphanitic matrix.

They are also divided, according to color, into leucophyres (f. n.), which include all light-colored porphyritic, aphanitic, igneous rocks, and melaphyres (f. n.), which include all dark-colored porphyritic, aphanitic, igneous rocks. Depending upon the phenocrysts, again we have—
1. Quartz-leucophyre (f. n. , or light-colored quartz-porphyry.
2. Feldspar-leucophyre (f. n.), or light-colored feldspar-porphyry.
3. Hornblende-leucophyre (f. n.), or light-colored hornblende-porphyry.
4. Quartz-melaphyre (f. n.), or dark-colored quartz-porphyry.
5. Feldspar-melaphyre (f. n.), or dark-colored feldspar-porphyry.
6. Hornblende-melaphyre (f. n.), or dark-colored hornblende-porphyry, and so on, the second word indicating the color, and the first the phenocryst of the porphyry described.

Division C—Glasses.

1. Obsidian (f. n.) is vitreous rock of any color, usually black, often red, less often brown or green. When porphyritic this becomes porphyritic-obsidian (f. n.).
2. Pitchstone (f. n.) is a rock resinous in appearance, less lustrous than obsidian, and lighter colored. When porphyritic this becomes porphyritic-pitchstone (f. n.).
3. Perlite (f. n.) is a glassy rock with perlitic texture produced by small speriodal fractures. When porphyritic this becomes porphyritic-perlite (f. n.).
4. Pumice (f. n.) is a highly vesicular glass, white or very light colored. When porphyritic this becomes porphyritic-pumice.

REFERENCES.

Reference is suggested, in connection with the above, to the following:
1. Quantitative Classification of Igneous Rocks, by Whitman Cross, Joseph P. Iddings, Louis V. Pirsson, Henry S. Washington.
2. Geology, Volume I. Geologic Processes and their Results, by Thomas C. Chamberlain and Rollin D. Salisbury.

FIELD WORK.

During the fiscal year field work was performed in connection with investigation of mineral resources and the securing of data for general information and for reports and published bulletins by members of the bureau, as follows:
1. Completion of Lepanto work, Messrs. Eveland, Goodman, and Ickis, and Mr. Riendeau (temporary employee), July 1 to August 3, 1904.
2. Exploratory work in Calamianes Islands, Mr. McCaskey, September 13 to 21, 1904.
3. Field work and collecting in Bulacán, Mr. Ickis, October 25 to 29, 1904.
4. Preliminary work in Masbate, Mr. Eveland, October 26 to November 4, 1904.
5. Field work, Laguna and Rizal, Messrs. Eveland and Ickis, November 6 to 13, 1904.
6. Exploratory work in Mindoro and adjacent islands, Mr. McCaskey, November 6 to 13, 1904.
7. Field work, Lepanto and Benguet, Mr. Eveland, January 16 to February 14, 1905.
8. Field work, Mariveles, Bataán, Messrs. McCaskey and Ickis, January 26 and 27, 1905.
9. Field work, Laguna, Messrs. McCaskey and Ickis, February 2 to 19, 1905.
10. Exploratory work, Romblón, Sibuyán, Mindanao, Camiguin, Siquijor, Negros, and Masbate, Mr. McCaskey, March 18 to 31, 1905.
11. Field work, Pangasinán and Benguet, Mr. Eveland and Mr. Weber (temporary employee), March 11 to June 30, 1905.
12. Field work, Batan Island and adjacent territory in province of Albay, Mr. Smith, March 18 to May 15, 1905.

The above field work, performed at a cost to the bureau of ₱2,513.40 for all field expenses, includes investigations of the geology and gold and copper deposits of Mancayan and Suyoc, in Lepanto, of the Antimok and Bued River districts of Benguet, and of Salasa, Pangasinán; of the gold deposits of Masbate, and of building stone at Talim Island, Laguna de Bay, by Mr. Eveland; of the geology, coal, limestone, and volcanic areas of the island of Batan and vicinity, by Mr. Smith; of the building stones and clays of Rizal and Laguna; the iron deposits of Angat, Bulacán, and the building stones of Mariveles, Bataán, by Mr. Ickis, and of the general geology and mineral resources of a number of points upon various islands visited by the chief of this bureau during the year.

Since the completion of the fiscal year 1905 and previous to the writing of this report, the chief of this bureau has visited the islands of Banton, Romblón, Tablas, and Semerara; Mr. Goodman was in the field in the Angat iron region of Bulacán from August 8 to 13, and Mr. Smith investigated the copper deposits of the Loboo Mountains in Batangas Province between August 25 and September 6.

Future field work planned includes the completion of the investigations of the ore deposits of Benguet, Masbate, and Camarines provinces by Mr. Eveland; the completion of the study of the coal deposits of Batan, Albay, and Polillo, and the beginning of an extensive investigation of the coal and oil areas of Cebú by Mr. Smith; the investigation of sulphur deposits and areas for the profitable working of placer gold by Mr. Goodman, and the continuation of his studies in limestone, building stones, and clays by Mr. Ickis, together with investigations of conditions and of the mineral resources of Benguet, Masbate, the Camarines, and elsewhere by the chief of this

In addition to the above, it is planned that Mr. Smith begin a general investigation of the iron deposits of the islands, make especial visits to promising coal fields, and collect fossils for age determinations of Philippine rocks; that Mr. Goodman secure general information in the field concerning the mineral resources and statistics, and that all members of the bureau perform field work of a minor nature as occasion may demand.

The importance of available deposits of workable steaming coal is becoming constantly more marked, particularly in view of the prospective railway extension in these islands, and since the recent highly successful experiments of the bureau of government laboratories have demonstrated that satisfactory paper can be made from Philippine fibers, the importance of a reliable local supply of sulphur is also great.

The field work performed by members of this bureau has been highly satisfactory in its execution, and fruitful, it is believed, in important results.

Bulletins with maps, sketches, photographs, and analyses upon the ore deposits of Lepanto and of Benguet, and a petrographic paper upon the rocks of these regions, by Mr. Eveland; upon the coal measures of Batan Island, and petrographic and paleontologic papers therewith, by Mr. Smith, and upon the clays of central Luzón, by Mr. Ickis, are now in preparation for the press, and material for a bulletin, with maps and photographs, upon the mineral resources of the islands, is being gathered for publication at the earliest practicable time.

Special credit is due to Messrs. Eveland, Smith, Goodman, and Ickis for their loyal, active, and intelligent cooperation and for the excellent character of their work. They have demonstrated their value to the bureau, have already broadened our knowledge of known mineral resources, have freely offered and rendered assistance in the field to those interested in the mineral industry, and have gathered and worked up new and valuable material above-mentioned and now in course of preparation for published form and general use.

In concluding this portion of my report I respectfully invite your attention to Exhibits B and C, narrative reports, respectively, of field work performed in compliance with my instructions, in Benguet and Pangasinán by Mr. Eveland, and in Batan by Mr. Smith; and to Exhibits D and E, special reports made by my direction, as results of investigations of the Bulacán iron industry, together with conditions of market, labor, and transportation, and a design of suggested improved blast furnace for Angat ores by Mr. Goodman, and of the possibilities for building stone in the region of Laguna de Bay by Mr. Ickis, respectively, the four reports constituting portions of the work of the staff of this bureau during the past year.

SURVEYS AND MAPS OF THE PHILIPPINES.

The maps of the Philippines available at the present time are entirely inadequate to present and future needs. This is illustrated by the great lack of available topographic data for railway, waterway, highroad, and other surveys, not to mention requirements of topographic base maps for mineral, forestry, agricultural, and other industrial surveys of importance, and for geographic, geologic, ethnographic, and other scientific surveys of direct practical application and use. At the present time special topographic surveys must be made for each project carried out, upon scales suited to the special work involved, and therefore not necessarily in harmony with other scales used. This work is not by any means a total loss and is at present actually required, but it is not believed to be in accordance with highest cartographic or economic demands for reasons herein outlined. A more serious state of affairs is found in the fact that no primary triangulation of the islands is known to have been made from which a skeleton frame may be constructed upon which secondary or tertiary triangulation maps and accompanying topographic data may be fitted as fast as secured. The result is that minor triangulations with topographic maps of limited areas now being made from field surveys absolutely required for present needs will not necessarily fit together without adjustment that may be costly in the end.

The great need at the present time is therefore a primary geodetic triangulation of the islands. This must be made, sooner or later, as a fixed basis for all future Philippine survey work of whatever kind. Following upon this, which could be made under the direction of the Bureau of Coast and Geodetic Survey as a logical and proper extension inland of its present excellent astronomic work, and at probably no very great additional cost, should be a secondary triangulation, similar in principle and execution, subdividing the skeleton frame into fixed areas of limited extent which could then be covered by a bureau of topographic surveys, composed in part of, and operating with, the insular bureaus involved. Great economy over present necessary conditions would, it is believed, thus inevitably result. These topographic

surveys systematically executed over areas to be successively covered in proportion to their importance would then be portions of a well-regulated system giving proper and adequate control over all areas required. The public land surveys, including surveys of mining claims, are in actual need of triangulated base maps, and without them serious trouble in connection with boundaries seems in store for future settlement. Surveys are now being made to satisfy actual present needs by the military and civil governments over various limited areas, for various purposes, all of them practical, and upon various scales. These surveys would be of greater final value, it is believed, were they executed upon the systematic plan suggested above.

In connection with the scientific survey of the Philippines by the Federal Government, and the plans of the committee as published and generally understood, it is respectfully suggested that the great need of these islands at the present time, and in addition to the work now being carried on by insular bureaus composed of trained men already in the field, is a base map as outlined above, upon which all maps of limited area may be fitted as parts of a systematic whole.

PHILIPPINE MINING AND MINERAL RESOURCES IN 1905.

The outlook for a profitable mineral industry is more hopeful to-day than it has been at any time since the American occupation. An increasing interest is being shown in mineral claims, and capital will probably be more readily obtained in the future than it has been in the past. It is believed that the "law of the survival of the fittest" has held good here, as elsewhere, and that the most promising mining claims we hear of to-day are many of them worthy of serious consideration.

Much activity in prospecting and development work was shown in several districts last year. Modern machinery has begun to arrive from the United States, and more of it is understood to be ordered and expected at an early date.

Mining development is now being carried on in the provinces of Lepanto-Bontoc, Benguet, Pangasinán, Nueva Écija, Bulacán, Rizal, Batangas, Tayabas, Camarines, Albay, Masbate, Cebú, and Mindanao, while prospecting is being done in almost every island of the archipelago.

In Lepanto, in the copper district of Mancayan, about forty claims, including the Santa Bárbara and Sin Nombre pertenencias of the Spanish régime, all now located under the present mining laws, have been secured as an option by agents of a New York syndicate, and an expert is understood to be expected from New York to examine these properties in October of this year. The old Spanish workings have uncovered large bodies of high-grade copper ore on the Santa Bárbara and Sin Nombre claims, and it is anticipated that much systematic exploration work will be done upon the adjoining properties upon the arrival of the syndicate engineer. In Suyoc, just south of Mancayan, some important prospects are being developed by American miners at the present time. Gold and copper ores both occur here. Analyses by the bureau of government laboratories show four samples of Mancayan ores, collected by Mr. A. J. Eveland, geologist, mining bureau, to contain respectively 13.93 per cent, 16.5 per cent, 9.7 per cent, and 32.9 per cent in copper, and $4.75, $3.31, $1.65, and $0.85 to the ton in gold. The ores are "gray copper" ores, chiefly Tetrahedrite, Tennantite, Enargite, and Luzonite.

The Mancayan-Suyoc area was studied in 1904 by a field party from the mining bureau, consisting of Mr. A. J. Eveland, geologist in charge, Messrs. Maurice Goodman and H. M. Ickis, field assistants, and field employees engaged for the work. The report of Mr. Eveland has been completed and is now ready for the press. This report, covering the work of a geological reconnaissance, as more detailed work was not advisable in the absence of topographic base maps and extensive development work, will contain maps, photographs, and analyses of rocks and ores, and will be a welcome addition to the literature of the economic geology of the Philippines.

In Benguet some important development work has been done, particularly in the district of Antimok. Here lie the claims of Messrs. Clark, Petersen, Clyde, Lehlbach, Reavis, and others, most of whom have been at work here for several years. Although the ore bodies have not yet been subjected to the detailed investigation they deserve, this work will be taken up immediately by Mr. A. J. Eveland, geologist, mining bureau, who has just completed topographic mapping and other preliminary work in this district. The ore bodies are apparently very extensive and it is known that much of the ore is of a good grade, varying through the district from $5 to $50 per ton in gold, the most important pay streaks being worked averaging over $12 per ton. Many samples from tunnels and crosscuts, however, indicate such constant low-grade values also that mine sampling in Benguet, as elsewhere, should be conducted with great care, and in accordance with most modern practice, in estimating values of ore in the mass. This is particularly advisable

in view of the fact that similar samples, similarly taken in the same workings, show variations from $1.65 to $43 per ton as in Mr. Lehlbach's "Middle Reef" vein in which 4 feet of the pay streak gives the latter values, and the next 4 feet assayed only $1.65. This is an oxidized ore in a quartz gangue as far as uncovered, and if development justifies it it is understood to be Mr. Lehlbach's intention to treat it and ore from two similar veins by stamp milling and cyanidation. He has announced the plan of his company to order a 10-stamp mill with 1,000-pound stamps, short drop, and rapid discharge, and a 100-ton cyanide plant, if present work proves large bodies of ore. According to Mr. Lehlbach, the vein systems of this district are closely related and are, above water level, largely of free milling ores. Messrs. Kelly, Clark, Petersen, Reavis, and Clyde have done sufficient work upon their claims to prove deposits worthy of serious consideration and the amount of ore to be probably large. It is understood that Mr. Kelly expects a 10-stamp mill with a cyanide plant to arrive from the United States within a few weeks, and Mr. Clark has just received a 3-stamp quadruple discharge Hendy mill and a 60-ton cyanide plant, all in charge of Mr. C. M. Eye, mining engineer. Messrs. Petersen and Clyde have built in Manila shops a 3-stamp mill for development purposes, and reports from Mr. Eveland indicate that they have had some satisfactory trial runs, cleaning up $10 to the ton from their plates on preliminary runs.

In the Bued River district Messrs. Hanson and Meade have uncovered a gold-copper lead, upon which a 3-stamp mill will be erected at once. This mill is now being built in Manila shops, and will be used for development and for trial runs. This ore is apparently a concentrating and shipping ore, and as the "Copper King" claim, upon which it occurs, is near the Benguet Road and enjoys excellent transportation facilities, it is planned that trial shipments of concentrates to the Tacoma smelter be made. In this connection it may be stated that in response to requests made by this bureau for Philippine miners, the Tacoma smelter offers inviting terms to ore shippers here, and has secured a rate per gross ton, f. o. b. Manila Bay and delivered on Smelter wharf at Tacoma, from the Boston Steamship Company, of $5 per ton.

In this district, also, Mr. Eveland reports that the ore outcrops on Mr. Petersen's "Gray Horse" claim are of lead, iron, copper, and zinc sulphides, carrying $20 to the ton in gold.

The 3-stamp mill that Mr. Hartwell built in Manila and operated at a profit on his "Hope" claim in Benguet has temporarily closed down, owing to the death during the year of the man who made it a success. Mr. Hartwell was a miner of the best type—conservative, competent, and combining within himself the sturdy qualities of the pioneer with the intrinsic worth of high American citizenship. His loss is not only a loss to the mining industry here, but to the large number of staunch friends he so readily made and kept. Mr. Hartwell was Kipling's "Explorer" personified, and whatever tribute may be found within those noble lines he richly deserves. He blazed the trail, explored the hills, found the gold, built the first American stamp mill in the Philippines, transported it to Benguet, worked his mine and mill and made them pay, all against constant obstacles that would mean failure to a man of less energy and grit. His reward was his successful struggle with difficulties that none but his kind can understand. His monument will be the gold-milling industry of Benguet.

In Pangasinán, in the foothills of the northern Zambales Range, near Salasa, a number of claims have been recorded and worked. The ores here are copper carbonates and sulphides, assays of three samples from the claims of Mr. W. H. Miller, who is the pioneer in this field, giving, respectively, 19.9 per cent, 11 per cent, and 18 per cent in copper; 13.2 ounces, 0.0 ounces, and 2 ounces in silver, and $2.76, $1.60, and $3.80 in gold. These claims are favorably situated with respect to transportation by water and by rail, and if development proves these deposits extensive, the prospects should seem good for profitable working.

In Nueva Ecija, near Gapan, and Peñaranda, on the Rio Chico, and elsewhere, extensive deposits of placer gold have been known for many years. No veins are yet reported, but prospecting in the placer ground is being actively prosecuted at the present time.

In Bulacán, in the mountains east of the towns of San Miguel and Angat, important deposits of rich hematite and magnetite iron ores have been known and worked by natives in a small way for over a century. Analyses of these ores have shown many of them to be very pure, and some of them fully up to Bessemer grade. Samples of them have been sent by the mining bureau to the steel works of Lewis & Hazlett, of Wheeling, W. Va., for analysis and report, and correspondence is now in progress with iron works of Japan looking to the profitable shipment of these ores. Analyses made by the bureau of government laboratories for the mining bureau and

published in Bulletin No. 3 of this bureau—A Geological Reconnoissance of the Iron Region of Angat, Bulacán—gave the following results:

	No. 1. Hematite.	No. 4. Magnetite.	No. 5B. Hematite.
	Per cent.	*Per cent.*	*Per cent.*
FeO	1.9	32.3	2.6
Fe_2O_3	88.2	48.7	84.2
MnO			
CaO	.1	Trace.	.3
MgO	.2	1.3	.1
Al_2O_3	6.5	15.3	8.7
FeS_2		Trace.	Trace.
CO_2		Trace.	Trace.
H_2O	.1	.1	.3
SiO_2	2.2	2.2	3.8
P_2O_5	Trace.	.1	Trace.
TiO_2	.8	.1	Trace.
Total	100.0	100.1	100.0

The natives of Bulacán have worked these iron ores in the open entirely and have smelted them in their small clay furnaces with charcoal as fuel. No flux has ever been used, although vast quantities of limestone are at hand. Excellent gray iron castings have been made for plow points and shares, and the usefulness and economy of these deposits are apparently capable of far greater attention and profit than they receive at the present time.

For additional and recent information concerning the Angat iron region of Bulacán, attention is respectfully invited to Exhibit D, above referred to, and accompanying this report.

In Rizal Province placer washing for gold has been carried on by the natives for many years, and this has led American prospectors to the search for the origin of the gold in the hills. No important discoveries have as yet been made, however, other than the discovery of platinum, first identified in small amount by this bureau in placer sands from Rizal during the past year. In Rizal Province also, in the vicinity of Bosoboso, there are coal and iron deposits which deserve more attention than they have yet had. At Binangonan occurs a limestone, fossiliferous in part (the "nummulitic" limestone of Baron von Richthofen),[a] which has recently been examined with reference to its use in the manufacture of Portland cement. An analysis of a sample of this limestone collected by Mr. H. M. Ickis, field assistant, mining bureau, made by the bureau of government laboratories for this bureau, gave the following results:

Binangonan limestone.

	Per cent.		Per cent.
Water at 110°	.16	MgO	1.19
Loss on ignition	43.15	K_2O	.28
SiO_2	1.12	Na_2O	.49
Al_2O_3	.08		
Fe_2O_3	.07	Total	100.38
FeO	.06	Specific gravity	3.29
CaO	53.78		

This is at once seen to be an excellent material for the purpose of making cement, and there is available clay in the vicinity and good water transportation to Manila. Capitalists are now giving this proposition careful consideration with a view to erecting a modern rotary plant, to cost not less than $225,000. There has been, and will be, a large demand for cement in the Philippines, and with the vast quantities of limestone and clay known to occur in the Philippines it would seem unfortunate if cement can not be made here at a profit and of standard grade.

In Batangas Province work has been done in the Lobo Mountains upon 21 claims containing copper ores, two surface samples of which have assayed, respectively, 2.71 per cent and 17.1 per cent in copper, with a trace of gold in each, and a third showing 10 per cent in copper and $8 in gold.

The veins are of two systems and of the fissure type, according to Mr. Smith, who has studied them, in dioritic rock (petrographically yet undetermined), and are from 6 inches to 2 feet wide, with an east-west strike for the major system and N. 45° to 57° W. for the second.

[a] The fossil forms of this limestone have recently been shown by W. D. Smith, geologist of this bureau, to be *Orbitoides*.—H. D. McCaskey.

The principal minerals are bornite, chalcopyrite, tenorite, cuprite, chalcocite (?), malachite, and azurite. Traces of silver are carried by the copper, and one assay has shown the ore to carry $8 gold to the ton. Molybdenite has been found scattered throughout some of the same veins in which copper occurs. The veins are principally of quartz, but porphyry and pegmatitic veins have been seen.

Up to the present time little more than assessment work has been done, but further development work will shortly be undertaken.

These properties are situated very advantageously for mining work, being about 600 feet above sea level and not more than 5 miles from a good harbor at Guinasepa, on the east coast of Batangas Province. Timber and water in abundance are available.

In Tayabas Province a large number of coal and petroleum claims have been recorded during the past year, although it is not known that extensive development work has been done upon them. The Tayabas petroleum field lies on the eastern side of the peninsula, on the Ragay Gulf. It has been reported that analyses of the petroleum have shown it to be of superior quality. No wells have yet been driven to thoroughly prospect this field, so far as known.

In the island of Polillo, off the Pacific coast, a large number of coal claims have recently been recorded. They cover a series of four seams, each apparently about 4 feet thick, outcropping with an approximate north-south strike and a westerly dip. The tonnage of available coal covered by the claims recorded is probably very great. No figures can be given, however, in advance of development work. There are no marked evidences of faulting or undue disturbance of strata, although folding undoubtedly occurs. Good harbor facilities are available, and upon the whole these claims are considered worthy of serious consideration as affording a probable supply of workable steaming coal. Outcrop samples give the following analysis:

	Per cent.
Moisture	4.7
Volatile combustible	43.5
Fixed carbon	50.1
Ash	1.7
Sulphur	.28
Calorific value	6,897

These coals are under investigation at the present time.

In the Camarines Province the Spanish concessions upon the extensive gold deposits in the districts of Paracale and Mambulao have been largely relocated by American mining men under present laws and without friction with the former concessionaires, and some work has been done in the reopening of abandoned shafts and in preparation for future systematic development. The important ore bodies of this district are reported to be contact deposits between crystalline schists and diorite and to be well defined, so far as uncovered. The contact is reported as traced for 20 miles, and along this all mining in this field has been done. Two vein systems intersect each other through the district approximately at right angles, the enrichment at some intersections having been reported upon as developing exceedingly high values. The strike of the most marked vein outcrops varies between 5° to 40° east, and the dip is reported to be southeast. The veins are 1 to 8 feet wide, and the vein filling is quartz. Deep mining will probably involve pumping expenses of no mean consideration, but it is understood that much valuable ore may be taken out before this expensive stage of mining is begun. It is fully believed that the deposits are worth the attention of competent mining engineers retained by sufficient capital to work these mines, but in the meantime a preliminary step will be taken this year in a careful study on this field by the detail of Mr. Eveland, geologist, to the work of a reconnoissance and the preparation of a general report upon the ore bodies themselves, and possibly by the further detail of Mr. Maurice Goodman, field assistant, to a careful survey of the placer fields of the Paracale and Malaquit rivers. Assays of ore samples from this district have averaged $20.92 in gold to the ton for the "San Mauricio," a representative group of claims covering deposits of partially refractory ore, and this for a large amount of systematic sampling done by five different mining engineers. Assays of the "Tumbaga," a free-milling gold quartz vein, upon which a 10-stamp mill will probably be erected in February of next year, have given exceedingly rich returns, but as the sampling has been less carefully done upon this vein it would serve no good purpose to quote values here. The ores are sulphides of iron, copper, lead, and zinc, complex auriferous smelting ores in part, and in part suitable for milling and cyanidation or chlorination. The placers have yielded important amounts of gold in the past, some of the nuggets being unusually large. While it may be somewhat doubtful whether sufficient rich placer ground remains for panning or sluicing methods, recent samples of gravel from the river beds indicate that dredger work here would pay. The average of nineteen samples of gravel

recently taken by Mr. Robert Lienau from the Malaguit River and examined by Mr. H. M. Ickis, field assistant, shows a value of 16 cents to the cubic yard. It is anticipated that notwithstanding mistakes that may have been made in the rather extensive development of the presumably rich ore deposits of this district in the past the gold ores of Paracale and Mambulao, together with the placer fields are most decidedly to be reckoned with in future work.

In Albay Province, in Batan Island, Lieut. H. L. Wigmore, Corps of Engineers, United States Army, assisted by a detail of men, has been prosecuting an examination of the coal deposits for the military government by means of the diamond drill. Mr. W. D. Smith, geologist, mining bureau, has been detailed to work out the economic geology of this area as his first work on the Philippines coal measures and has been in the field for the past three months. His preliminary report is now about ready for the press. The quality of the best Batan coals, which are classified by Mr. Smith as bituminous coals of Tertiary age, is shown by chemical analysis, calorific tests, and practical experimental use in boilers to be excellent and apparently fully suitable for steaming use. The quantity of the coal is believed also to be important as are favorable local conditions for handling and shipping. Further and deeper borings should be made in Batan, however, before extensive mining is begun to to determine the continuity of the seams. Analyses by the Bureau of Government laboratories of some of these coals follow:

	No. 1.	No. 2.	No. 3.
	Per cent.	*Per cent.*	*Per cent.*
Moisture	6.62	9.54	6.06
Volatile combustible	38.68	41.56	40.36
Fixed carbon	54.42	44.86	51.24
Ash	1.28	4.05	2.32
Sulphur	.14	2.37	.40
Calorific value	.....	6,983.00	6,487.00

In Masbate, in the northern part of the island near the town of Aroroy, more or less work has been done upon sixty or more claims, principally of free-milling gold ores in quartz, and upon twenty or more gold placer claims on the Lanan and Guinabatan rivers. Manganese and iron ores of high grade have also been found here, but little attention has been given them up to the present time. Upon claims of the Eastern Mining Company, Mr. A. Heise has just erected a 5-stamp mill, purchased from the Union Iron Works of San Francisco, to handle the free-milling ores, and as a result of successive trial runs aggregating eleven and one-half days, during which an estimated supply of 100 tons were crushed, fine bullion to the value of $954.67 was obtained. This would indicate the value of the ore to average a saving of $9.55 to the ton. Upon the quartz claims of the Cogran Mining Company, on the Lanan River, a considerable amount of development work, showing most favorable indications of large quantities of free-milling ore, has been done. A series of parallel veins in granite and serpentine, the relations of which are yet undetermined, are reported here with a secondary system of intersecting veins. Upon the "Queen of Sheba" claim of this district there is an estimated dump of 2,500 tons of free-milling ore valued at from $8 to $42 per ton, the result partly of recent extensive open-cut work and the sinking of an inclined shaft on the footwall, and partly of ancient workings carried on in a primitive way. An arrastra, driven by carabao power, has been successfully at work here for several months past, and the erection of a modern stamp mill will probably follow during the present year. Upon four claims of the Aroroy district a 10-stamp mill, originally intended for Benguet, and now in the Islands, will be installed at once by the Philippine Gold Mining, Power and Development Company, according to plans recently announced. Upon the placer ground of the Philippine Mining Company, on the Lanan River, a Risdon dredge, which represents modern and thorough workmanship in every detail, has just been completed and launched. This dredge will handle 1,000 cubic yards of gravel per diem, the gravel running, according to the estimates of Mr. Fred L. H. Kimball, consulting and managing mining engineer in charge, 25 cents and over to the yard. As the dredge should work for a total cost of less than 9 cents a yard a good profit would seem to be in sight. Upon the placer claims of the Masbate and Oriental Mining Company, on the Guinabatan River, a similar Risdon dredge, just arrived from the United States in charge of Mr. H. J. Robinson, will, it is hoped, be immediately installed. The Aroroy and Lanan mining districts of Masbate have been in most energetic and progressive hands, but have attracted less attention thus far than they deserve.

In Cebú but little more than prospecting has been done during the American régime. There are important deposits of steaming coal in this island and two known deposits of lead ores. An analysis of coal from the promising coal measures of Carmen, containing four seams reported to be 14 feet, 13 feet, 9 feet, and 17 feet thick, respectively, will give an idea of the purity of the best Cebú coals:

Coal from Carmen, Cebú.

	Per cent.
Moisture	5.00
Volatile combustible matter	43.92
Fixed carbon	48.51
Sulphur	.37
Ash	2.2
Total	100.00

These bituminous coals are better than many American lignites mined, sold at a profit, and used with success upon railway and steamship lines in the United States, and they have been proved by practical tests in steamships in Philippine waters to do very well indeed. Furthermore they should be put on the Manila market for $3.25 per ton and on the market at Cebú for $2.50 per ton, as against Japanese coal at approximately $5 and Australian coal at $6 per ton.

In Mindanao some development work has been done by a little group of American miners at Placer, Surigao Province, but no late reports from this district are at hand. Some prospecting has also been done in Mindanao, and it is known that there is coal at Bislig and Sibuguey, and placer gold on the Agusan River and at Pigtao near Misamis. This vast island is geologically yet unexplored.

Recent reliable reports are to the effect that asbestos has been found in quantity in Ilocos Norte, that metallic mercury has been found in Masbate, in the Camarines, in Zambales, and in Mindoro on the east coast, that manganese deposits are cut by the Capas-O'Donnel road, that tin and tungsten have been found in northwestern Negros, that infusorial earth occurs in Zambales and probably in Abra, and Mr. Smith has just reported the discovery by him of molybdenite ores in veins in the Loboo Mountains of Batangas Province.

In addition to the above mineral deposits that have received some active attention or have just been reported or discovered, gold, platinum, copper, lead, zinc, manganese, iron, antimony, mercury, coal, sulphur, petroleum, salt, gypsum, limestone, clays, and building stones are known to occur in the Philippines as mentioned in the fifth annual report of this bureau and as indicated upon the general mineral map of the islands published with that report and reproduced herewith. A forthcoming bulletin of the bureau presenting the latest and most complete information concerning the mineral industry, statistics, and resources of these islands will be issued, it is hoped, during the coming year.

No more than investigation and development work have yet been done and there are as yet no Philippine mines as the word "mine" is properly understood. In fact there is little "ore in sight" in the sense that it is blocked out. But the indications are in many cases distinctly encouraging to more extensive work.

Although the matter of transportation is not yet satisfactory and must necessarily remain a factor of great cost until the promised and prospective improvements of coastwise shipping and rates, of extensive railway construction, and above all of a greater mileage of good wagon roads of moderate grade, may have materialized, the labor problem has not yet interfered seriously with mining development; nor is it expected to prove a factor of great uncertainty or cost. My favorable views. expressed in the fifth annual report, concerning the possibility of developing sufficient and satisfactory mining labor in the Philippines, of Japanese and natives or of natives alone, under competent white supervision, remain unchanged. I further believe this labor to be counted upon to afford mining at comparatively low cost and therefore to render profitable comparatively low-grade ores. Mining costs in the Philippines have so far been relatively low and native labor has been almost exclusively employed. I am informed by Mr. Lehlbach, who has employed Japanese and native labor in Benguet, that he estimates his total mining costs to be $0.70, his crushing, sorting, and tramming to be $0.24, and his milling and cyanidation to be $0.89 per ton, United States currency, on a basis of treating 4,000 tons of ore per month, and the above costs to be reduced to $0.49, $0.17, and $0.59 per ton, respectively, on a basis of 15,000 tons per month—this with native labor utilized under white foremen. These figures give totals of $1.84 and $1.25 per ton, respectively, but it is yet an open question whether costs so low can be maintained. Certainly they do not include

pumping or hoisting from depth. In the Camarines Province it has been estimated that the total cost of mining, milling, concentrating, and management would be excessive at $5 per ton. In Masbate Mr. Heise reports that the total cost of mining, milling, fuel, and management with native labor has averaged $3.75½ per ton. The above are all gold-mining, stamp-milling, and development costs. In coal mining it has been estimated that at Carmen, in Cebú, the total cost of mining should not exceed $1 per ton. In Batan Island, according to Mr. Smith, with Japanese labor total mining costs have been $2 to $2.50 per ton. Lieutenant Wigmore estimates, however, that with Japanese and native labor mixed, and working on a commercial scale, total mining and loading costs should not exceed $2 per ton. The above costs, it must be remembered, are during the pioneer stage of development and adjustment to new conditions; it is expected that they will be reduced in time, with the exception of Mr. Lehlbach's estimates. At least two mining men, doing development work, have stated to me that their preference is for native labor over Japanese, and the tendency is for the native to step into his proper place in Philippine mining and furnish the bulk of the labor required. It is not contended for a moment that native labor in general has been entirely satisfactory in the Philippines during the past few years, but it is contended very strongly that for this unfortunate condition of things, particularly with reference to agricultural labor, the laborer has been by no means entirely to blame; and with special reference to a relatively new field such as mining it is believed that with the absolute essentials of (1) fair treatment, including reasonable wages and prompt payment, and (2) competent supervision a sufficient and satisfactory quality of native labor may be depended upon.

On the whole, therefore, the mineral industry of the Philippines has steadily grown. What its future may hold can not be safely prophesied now, but with the islands at peace and under a safe and stable government, with no more of a labor problem than it is believed can be overcome, with increased transportation facilities in sight, with more confidence on the part of capital, and a better showing on the part of prospecting and development work, a conservative estimate would indicate a bright outlook for the coming year 1906. It is hoped and believed that the sturdy pioneers who have blazed the trail through many a heartbreaking day in fever swamp, jungle, and forest during years of peril and privation, the full tale of which will never be told, will yet come into their own, and through them that the mineral industry of the Philippines will prove an important factor in the development of prosperity and progress under American rule.

MINING LAW—URGENT NEED OF MODIFICATION.

I have the honor to invite your attention to certain sections and provisions of the act of Congress approved July 1, 1902, entitled "An act temporarily to provide for the administration of the affairs of civil government in the Philippine Islands, and for other purposes." These sections and provisions constitute portions of the mining legislation at present in force in these islands, and, by reason of their restrictions, have been subjected to constant complaint and frequent request for their repeal or modification, by interests proposing and attempting the difficult work of development of the mineral resources of the Philippines.

The sections and provisions of the above-mentioned act that have been most severely and frequently criticised are as follows:

Section 33 (entire): "That no holder shall be entitled to hold in his, its, or their own name, or in the name of any other person, corporation, or association, more than one mineral claim on the same vein or lode."

Section 56 (pertaining to coal lands): The last two provisions: " * * * and all persons claiming under section 58 shall be required to prove their respective rights and pay for the lands filed within one year from the time prescribed for filing their respective claims; and upon failure to file the proper notice or to pay for the land within the required period the same shall be subject to entry by any other qualified applicant."

Section 75 (pertaining to corporations): The following provisions: " * * * and it shall be unlawful for any member of a corporation engaged in agriculture or mining, and for any corporation organized for any purpose except irrigation, to be in any wise interested in any other corporation engaged in agriculture or in mining."

The discussion of these sections and provisions will now be undertaken from the standpoints of my connection of over five years with the mining bureau and the development of the mineral resources of these islands; of my observations for nearly three years upon the working of these provisions, and particularly of section 33; of the complaints and appeals constantly made by prospectors, miners, and others interested in our mineral resources concerning the application of these severe restrictions

under present and local conditions; and finally of some serious study upon my part during these periods concerning these conditions to be dealt with, and the advisability of more liberal legislation at the present time.

Section 33: It has been understood that the Congress of the United States, in its wisdom, provided this section for protection of the natives of these islands as against exploitation on the part of Americans, or others, "at the expense of the Filipinos," and that for this purpose alone this restrictive measure was deemed necessary at the time—that is, in July, 1902.

It has been a matter of common observation, I believe I may safely state, in these islands during the past three years, that no undue or improper efforts have been made, that might have been prevented by section 33, by Americans or others to exploit mineral lands at the expense of the Filipinos. In other words, it has never clearly appeared that natives of these islands would have suffered injury or loss through the operation of the present mining laws, with section 33 omitted entire.

On the other hand, the great difficulties of geological exploration and field prospecting, due to the excessive obstacles imposed by the luxuriant forest and jungle growth of the Tropics, and by the excessive thickness of soil overlying rock formations; of the present limitations in number of intelligent prospectors and miners; of the great distance from the United States, wherein would naturally lie the greater portion of the previous associations and support of this prospecting class; of the consequent difficulty of securing capital; and of the somewhat uncertain political future of these islands—these difficulties and others have combined to check mineral exploration and development, and the result is that large portions of the islands have not been covered by prospectors even to the present day. It will therefore be seen that there has been no tendency shown as yet to overdo prospecting in the Philippines, nor has capital in any important amount interested itself in this necessary preliminary work. The Filipinos as a race have not been made to suffer during the prospecting and locating already done, and the few cases of claim jumping, common to every mining camp, have been irrespective of race. Finally, whatever contests concerning mining lands have been argued in the courts have been impartially and judicially acted upon.

The purpose and intent of the Congress of the United States, as exhibited throughout the act of July 1, above quoted, were plainly to protect the people of these islands against monopolies, corporation rule, and unfair and dishonest acquisition of the public lands, mineral and otherwise. This expression of fair dealing to a people, conquered or acquired, has been followed by the honorable the Philippine Commission, as well as by the Administrations and the Congress of the United States, in spirit and in letter throughout all the formative and constructional work performed in connection with the American occupation of these islands during the past five years. This principle of protection of the rights of the Filipinos meets with the hearty approval and wins the active support, it is believed, of all right-thinking Americans; and it is not believed that there is any tendency, either in the Philippines or elsewhere, to exploit these islands at the expense of the Filipinos which can not be met and as completely checked as is possible by legislation by the honorable the Philippine Commission, or by the Philippine assembly to be elected within a few years. It is believed that it can be shown, furthermore, that with the delegation of the interests of the natives of these islands to the legislative powers at present representing the United States in the Philippines there is no present necessity for the continuance of the restrictions of section 33, and that rather there is grave danger during such continuance that the mineral resources of these islands will not be exploited at all—this at the real expense of the Filipinos, to whom the greatest ultimate advantages must come by the development of what latent mineral wealth may here be found.

In July of 1902 there was no court of record competent to pass upon and settle disputes arising over titles to lands, mineral and otherwise; and at this time, following upon the years of Spanish rule, there were found large and valuable portions of public lands claimed under various laws, provisions, and customs by Spaniards, natives, and others, with titles more or less imperfect, inchoate, or completely void. At this time, and without legislative and judicial protection, particularly for mining claims such as was urged by my predecessor, the Hon. Charles H. Burritt, judge of the court of first instance, the rights of natives and others to land occupied in good faith by them were in many cases necessarily without legal support. Since the passage of the act of Congress above frequently referred to, however, and on November 6, 1902, the honorable the Philippine Commission created a court of land registration with complete power to pass upon land claims and to grant to natives and others, under the admirable Torrens system, the most complete protection for their

rights. Since that time also capital from the United States and elsewhere has been freely invited to develop the system of rapid transportation now successfully completed in Manila, a complete and modern telephone system for Manila and elsewhere, and a thoroughly modern and effective railway system for the entire archipelago. Not only have the honorable the Commission been empowered to invite bids for development of the city of Manila and of the islands along these lines, but they have also been authorized to encourage single bids or operations of single corporations constituting, practically, monopolies for the purposes above set forth. It is pretty generally agreed that it is the part of wisdom for them thus to act. In view of the above statement it is difficult to understand that a corporation or other consolidation of interests, or several of them, in a given mineral district might not safely be encouraged under such regulations and restrictions as the honorable the Philippine Commission may in its wisdom deem just. It is not therefore believed that the operation of section 33 is at present required upon the ground that it is necessary for protection of the best interests of the natives of the Philippines. Upon the other hand, it is the opinion, I think I am justified in saying, of the mining community and the government alike that the further operation of this section will be at a loss not only to the American citizens, who have been the potent factors in development in the Philippines, but also to the natives, who suffer precisely the same disadvantages as the Americans from the provisions of section 33 and who can profit no more therefrom.

As the necessity for protection of native rights provided for in section 33 does not now arise and as the honorable Philippine Commission has been charged, and have for five years exercised their most deliberate thought and greatest wisdom in their legislation, with the protection of native rights, as the natives have now the desired means for securing full and final recognition of land claims of whatever class through the court of land registration, and as there has never been, apparently, but the one motive, above assumed, for the enactment of section 33, it is respectfully submitted that this section may safely be repealed, thereby delegating to the honorable the Philippine Commission, who are in thorough touch with local conditions and demands, under sections 36, 49, and 52 of the act above quoted, the increased power following such repeal, to restrict undue appropriation of public lands.

Following an affirmative reply to the question "May section 33 safely be repealed?" there arises the further question "Should this section be repealed?" It has been the unanimous opinion of natives, foreigners, and Americans, official and otherwise, so far as I have heard opinion expressed upon this subject since the present mining legislation has been in force, that section 33 should be repealed. The reasons for this are not far to seek.

In section 21 of the act of July 1, 1902, the right to explore, occupy, and purchase mineral public lands is restricted to "citizens of the United States or of said islands." The most secure and profitable investment of capital in mineral deposits not patented in the Philippines would be that apparently coincident with rights to explore, occupy, and purchase. Up to the present time, during American occupation, foreign capital has shown almost no disposition to enter upon development of mineral claims, nor has such capital been encouraged so to enter, by legislation or otherwise. Up to the present time also, native capital has proved insufficient for the development of even a reasonable proportion of the agricultural resources, except in a most primitive way. It is therefore plainly evident that the capital absolutely essential to the development of the mineral resources of these islands in a thorough and profitable manner must, under American sovereignty, be expected to come from citizens of the United States. The distance to and from the United States is so great that close contact or communication, on the part of capital there, with possible fields of investment here, is only possible by representation through agencies in the Philippines, and in the case of mineral resources these agents would naturally be consulting mining engineers, metallurgists, or geologists, as the case may be. The expense of retaining professional men of this class even to report upon mineral fields is so great that it can only be considered under most favorable conditions, yet capital at the present time is dependent upon its consulting engineers as it is upon its attorneys, and properly so. It is reasonable to assume that no minor representative of capital, still less a consulting engineer, would visit the Philippines for the purpose of investigating and reporting upon the value of any one claim, 1,000 feet square, upon any one lode, or several such claims upon as many lodes, and yet no one person, corporation, or association could offer more under the law. It is obviously objectionable for capital to deal, or attempt to deal, with as many persons, corporations, or associations, as may desire claims; only under exceptional geological conditions could systematic mining methods be followed under such prohibitive conditions as these.

It is difficult at present, therefore, to induce capital in the United States even to

consider mining in the Philippines. But it requires capital to develop and patent claims, and it is with the unpatented that we are chiefly concerned. It would seem apparent from the above line of thought that capital from the United States will not become interested in unpatented claims under section 33, and that unpatented claims can not therefore be developed into mines. Exception to this might possibly lie in the case of bonanza or exceedingly rich claims; but it is probably unnecessary to add that bonanzas are relatively few; certainly they have not yet been discovered in the Philippines, where the richest gold ores have averaged in value from $2 to $50 to the ton. The great majority of the mines of the world are concerned with middle and low-grade ores, and Philippine conditions are like those of other mining regions in this respect. The greatest skill and professional ability of the modern mining engineer and metallurgist are dedicated to-day to technical improvements, by which costs may be reduced, and deposits of lower grade may therefore be made profitable to work. An essential to reduction of cost is the opportunity to consolidate claims and work upon a large scale. This is vital with low-grade ores. The problem is largely therefore one of cost, an economic feature even more severe in mining and in metallurgy than in ordinary business or governmental administration, for the reason that in reduction of cost the most expensive professional advice is required and the natural obstacles are complex and difficult to the highest degree.

In the Philippines the ores are of middle and low grade and economic problems enter from the first. In addition to this, problems of difficult tropic conditions, labor, transportation, and supplies must be met once capital is secured. The topographic, climatic, and geologic feature of the Philippines render prospecting exceptionally difficult, and to these and to other unfavorable conditions may be ascribed the lamentable fact that notwithstanding an occupancy of several hundred years our Spanish and native predecessors succeeded in developing no mines worthy of the name. Resulting from this, the natives of these islands are neither intelligent prospectors nor miners in the modern sense, and with the exception of a limited number of Igorotes, Bicols, and others, they do not know even primitive mining. There is, therefore, no important mining community among the Filipinos, and the interests of mining development are at present largely in the hands of a small number of American miners and prospectors. Were these men to leave the islands, as many of them have done, the mineral resources would undoubtedly lie undeveloped for an indefinite number of years, as there is no mining class among the natives yet bred to take up their work. The future of the mineral industry is believed, therefore, for the present to be dependent upon these hardy, intelligent, and invincible American pioneers who have laboriously blazed the trail as they and their forbears developed our West. They have penetrated the wilderness and have in five years developed and opened up several promising mining districts that were little known and less developed during all the centuries before they came. They have overcome, and it is believed can overcome, every important obstacle save a lack of sufficient capital to proceed with their work. For several years they have drawn upon their own limited resources and those of their friends in the Philippines; they have now reached that point when capital upon a larger scale is practically an essential to success. They have developed mineral districts, but their finds have largely been in middle-grade and low-grade ores. The problem of cost of mining and cost of production is a vital factor in their relations with capital, and it is therefore necessary that they be able to offer more—to guarantee the further development required to justify erection of works—than section 33 will allow. Extensive deposits of the above class of ores are believed to exist in the Philippines, and after five years of work in these islands I am prepared to express my belief that an important and profitable mining industry can be built up here with proper encouragement, and this with no menace whatever to the rights of the natives, but rather to their material advantage in all that development and industrial progress must necessarily mean to them.

In their annual reports for 1903 and 1904, the chief of the mining bureau, the honorable the Secretary of the Interior, and the honorable the Philippine Commission have recommended the repeal of section 33. It is respectfully submitted that this action is now of vital importance to the mining interests of these islands, that it can be safely taken, and that it should be taken at the earliest practicable time.

Section 56: The provision within this section deemed hostile to early development of coal lands is as given above.

It should be stated here that, literally construed, this provision offers no objection whatever, for the reason that section 58, quoted in this provision, refers to saline lands alone; and in Lindley on Mines, page 1683, this construction is evidently made, as the subject brief of this clause reads: "Saline claimants, when must pay." As

sections 53, 54, 55, 56, and 57, constituting the legislation embraced within the act of July 1, 1902, for coal lands, are almost literally the United States Revised Statutes, 2347, 2348, 2349, 2350, and 2351, constituting the present legislation for coal lands in the United States, and as the corresponding restricting clause in United States Revised Statutes 2350 refers to coal lands mentioned in United States Revised Statutes 2348, it is assumed that by taking advantage of an apparent typographical error alone in section 56 can the construction be that the lands referred to are the saline lands of section 58, and not the coal lands of section 53, which section corresponds to United States Revised Statutes 2348. The interpretation upon which the following is based is that accepted as the undoubted intent, though not literally expressed or legally binding perhaps, of the law as framed.

Although this provision is in terms the direct adaptation to the Philippines of a Federal provision now in force concerning coal lands in the United States (Rev. Stats., 2350), it is believed that under Philippine conditions a prescribed period of one year and sixty days is too limited a time within which coal claims must be entered upon, recorded, and sufficiently developed to demonstrate their value, and paid for in full. Geologic problems upon which values of coal lands depend have not yet been satisfactorily solved, and all difficulties relating to capital, as discussed under section 33, apply in this case. Furthermore, the payment for lode claims is extended over a period of five years, or until such time as accrued assessment work to the value of $500 may have been done upon each lode claim, or until the locator thereof desires to obtain a patent therefor by purchase at a fixed rate of $5 per acre. A locator of a lode is thus given sufficient time within which to prove the value of his claim, whereas the locator of a coal-land claim must be satisfied within one year and sixty days after occupation of his claim that he is prepared to pay the prescribed price in full. This involves the expenditure of large amounts of capital for development, surveys, and title within so short a period that under present conditions it is practically prohibitive.

It is respectfully submitted that the coal-land laws be revised to the extent that the period for development and payment be extended to at least three years, or until such time as the public lands involved may have been surveyed and mapped under a system of public-land surveys in harmony with United States Revised Statutes 2349, and the practice in the United States (Lindley on Mines, Vol. I, § 505), said revision delegating to the honorable the Philippine Commission such powers as may be required to encourage bona fide coal mining and to prohibit mere speculation in land or monopolistic control.

The coal resources of the Philippines are believed to be extensive and to promise an important supply of steaming coal. The economic features and importance of a home supply are so obvious that they will not be enlarged upon here. The local conditions above referred to are such, however, that it is believed a coal-mining industry must be encouraged by more liberal legislation than at present obtains.

Section 75: The provisions of this section, quoted before, considered inimical to mining development will in effect so circumscribe corporations as largely to discourage their interest in mining in any form. Furthermore, interests connected with corporation capital "organized for any purpose except irrigation" are prohibited from investing in either agricultural or mining projects which corporations may control.

These prohibitions are particularly severe in view of the fact that a large number of the best and most substantial capitalists are largely involved in corporate interests and that with these profitable and promising mining companies are closely allied as well. Were the interests of the natives or the general public menaced by corporation control or fraud the honorable Philippine Commission, it is believed, or the Philippine assembly, would, by such legislative restriction as may be required, extend to them all protection demanded under such conditions as may arise. This has even now been accomplished in the form of corporation capital invested in rapid transportation within the city of Manila, and of proposed corporation investment in modern telephone and railway development here.

It is respectfully submitted that the corporate interests, being largely the capital interests, should be encouraged under such protective legislation as the honorable the Philippine Commission may provide to assist in the development both of agricultural and of mineral lands. It is believed that this may safely be done without such prohibitive enactment as that above quoted in section 75, and considerations presented under the discussion of section 33 are submitted as bearing upon the operation of the restrictive clause of section 75 as well.

ADDITIONAL LEGISLATIVE DEFECTS.

In addition to the considerations above, and in connection with the proposed draft of an Act amending the Act of July 1, 1902, I desire to call your attention to additional important considerations as follows:

Assessment work.

(a) Should the time within which coal lands must be paid for be extended to three years, as urged above, it would seem advisable to require some assessment work corresponding to that upon lode claims and for the same reasons, i. e., to prevent the holding of tracts of land for speculative purposes alone. I would suggest therefore that a total of not more than $200 worth of assessment work for each coal claim held for three years be required before a patent be issued therefor.

(b) As the Philippine miners have frequently requested specific authority, such as is granted in the Federal law of the United States (see Lindley on Mines, p. 1167) to group assessment work for several claims in order that annual labor may be performed upon one of a group for the development of the whole, I would urge that a proviso be inserted in the proposed amended act to the effect "that where a group of two or more contiguous lode, coal, or placer mining claims are held in common the annual labor required by law for all in the group may be performed upon any one of them for the development of the group."

This, in my opinion, is a most important and valuable addition to the law.

Dredging claims in navigable and tidal waters.

In a recent letter to you upon this subject I invited attention to the important fact that after careful study I find there is at present no legislation, apparently, permitting the mining or dredging for gold or other metals in navigable and tidal waters of these islands, as many navigable and tidal streams and bays of the Philippines are believed to contain deposits of these metals that may be profitably worked, and as two modern dredging plants are now in Philippine waters for this purpose, I strongly urge the enactment of legislation, based possibly upon the Alaska Code of 1900, whereby these waters may be declared subject to exploration and mining by virtue of licenses to be granted by the governor-general and under such regulations as the Philippine Commission or their successors may provide.

Views of Philippine mining men.

In this connection I would state that not only in personal conversation with mining men in the Philippines and in the United States over a period of three years, have I been impressed with the unanimous conviction that present restrictions in Philippine mining legislation should be materially modified if not absolutely repealed, but that upon the occasion of the recent visit to these islands of the distinguished Congressional party, accompanying the honorable the Secretary of War, this office has received a large number of letters in response to a circular from this bureau requesting an expression of views upon this subject, strongly advocating prompt repeal of the restrictions mentioned above. These letters are from representative miners, prospectors, business and professional men, and are unanimous in their appeal for better mining laws, and with their writers I heartily sympathize and agree.

Conclusion.

In conclusion, attention is respectfully called to the fact that as far back as 1850 President Fillmore, in his first message to Congress, recommended that the public mineral lands "* * * be divided into small parcels and sold under such restriction as to quantity and time as will insure the best price and guard most effectively against combinations of capitalists to obtain monopolies" (Lindley on Mines, Vol. I, sec. 48), and that this was followed by the Acts of July 26, 1866, and of July 9, 1870, which were in turn superseded by the Act of May 10, 1872, now incorporated within the Revised Statutes and forming the present Federal mining legislation of the United States. In the first of these Acts only may be found any provision limiting the number of claims that any one person, corporation, or association may hold upon any given vein or lode, and this was repealed in 1872 when it was not deemed essential, apparently, to the best interests of the public that such restriction be required. Not again until the Act of July 1, 1902, herein frequently referred to, was such restriction

placed within Federal legislation, and in this instance for the safeguarding of the rights of the Filipinos rather more than of those of the public at large. No such restriction is known to me in any mining legislation elsewhere, and its workings may therefore be said to have been observed in the Philippines alone.

That this and other restrictions above noted should be wholly removed or materially modified in the best interests of the development of the resources, and through them of the people of these islands, I respectfully submit.

FINANCES OF THE BUREAU, FUTURE NEEDS.

For the expenses of this bureau for the fiscal year just past the appropriations were ₱25,000 for salaries and wages and ₱6,100 for field and office expenses, a total of ₱31,100. Of this amount there were expended for salaries and wages ₱23,992.95, leaving a balance of ₱1,007.05, and for contingent expenses ₱5,988.30, leaving a balance of ₱111.70. The total balance to the credit of the bureau for the year from unexpended funds is therefore ₱1,110.75.

For the coming fiscal year the estimated amount required for salaries and wages is ₱28,261.04, and for field and office expenses ₱13,207, a total of ₱41,468.04.

The increase in salaries and wages estimated, of ₱3,261.04, is made up of difference in salary of one geologist at ₱4,000 between the entire year 1906 and a portion of the year 1905, and increases in salary recommended of one field assistant from ₱2,400 to ₱3,600, and of one chief clerk from ₱2,800 to ₱3,200, for part of the year 1906, upon completion of two years of highly satisfactory service as mentioned above. The increase in contingent expenses estimated, of ₱7,107, is more than covered by estimated printing expenses for four publications of this bureau, and for forms, blank books, letter heads, etc., not estimated or provided for in 1905, amounting to ₱7,000, of postage and telegraphic expenses, in lieu of the free service of the past, and therefore not estimated or provided for in 1905 amounting to ₱2,540, and of an increase of ₱400 in field expenses for the more extensive work of the coming year; in all, amounting to an apparent increase in contingent expenses of ₱9,940, of which ₱9,540 is an estimate due to required estimates for expenses not charged against this bureau last year, thus showing a relative decrease in contingent appropriations of ₱2,833 for the fiscal year 1906, or a relative total increase of all appropriations over last year of but ₱828.04 for the coming fiscal year.

The just promotion of two especially loyal and efficient members of the bureau staff, the necessity for the increased field work possible with the completely reorganized bureau, and the demand for reliable published information upon the mineral resources of these islands, it is believed will fully justify the necessary increase of appropriations required. I can not urge too strongly that the severe economy which this bureau has attempted to maintain in the past and proposes to maintain in the future may be considered in appropriation of funds for the coming year.

SUMMARY OF RECOMMENDATIONS.

In concluding this report I have the honor to recommend:

1. That the status and organization of this bureau be maintained as provided for in Act No. 916.
2. That suitable quarters be provided for this bureau by the construction and equipment of a new wing to the present building of the bureau of government laboratories, of which wing the entire upper floor is desired.
3. That the Congress of the United States amend the present mining legislation as fully discussed above, delegating power to the honorable the United States Philippine Commission, or the Philippine assembly, to enact all laws required, if any, to prevent undue exploitation of the public lands.
4. That appropriations requested in estimate of funds required for the fiscal year 1906, be made that this bureau may be enabled to fully perform its proper functions as authorized in Act No. 916.

Respectfully submitted.

H. D. McCaskey,
Chief of the Mining Bureau.

The Secretary of the Interior,
Manila.

EXHIBIT A.

Financial statement, fiscal year ending June 30, 1905.

	Allowed.	Expended.	Balance.
Salaries and wages	₱25,000.00	₱23,992.95	₱1,007.05
Contingent expenses	6,100.00	5,988.30	111.70
Total	31,100.00	29,981.25	1,118.75

EXHIBIT B.

NARRATIVE REPORT OF BENGUET FIELD WORK BY A. J. EVELAND, GEOLOGIST.

MINING BUREAU, *Manila, June 29, 1905.*

SIR: In accordance with your instructions of March 10, 1905, proper equipment was selected, and on March 16 I left Manila via the Manila and Dagupan Railroad with one assistant, Mr. C. M. Weber, temporary employee of the mining bureau.

The work planned for the field season included an inspection of certain reported copper deposits in Pangasinán Province, the town nearest being Salasa, some 10 miles west of Dagupan. For this inspection, which was to determine, if possible, the advisability of further work, and to give such technical assistance as might be asked to those operating the properties, it had been arranged that I was to be met at Dagupan by Colonel Kennon, who would accompany me to the works. He was communicated with by wire, and as he failed to appear the day set by him, I went without him to the mines via Lingayen and Salasa on March 18.

Four days were spent with the miners looking over the ground, and I returned to Dagupan March 24, meeting Colonel Kennon en route.

Report was made to the chief of the mining bureau under date of March 26, covering this portion of the work.

Wagons were procured at Dagupan, and being exchanged for caretons and cargadores at Twin Peaks and Colgan's Camp, Baguio was reached March 26.

The first week was spent in preliminary surveying work, tieing in to the triangulation work of the Benguet road surveys and in running a short line (3 miles) out to J. F. Kelly's properties on the main Antimok trail. During some of this preliminary work fossils were collected from a large limestone bed just west of Baguio, the outcrop of which forms a prominent feature of the landscape.

Up to April 23 all but a little work, using Baguio as headquarters, was impossible. A series of illnesses, first of malarial fever of Mr. Weber, then of smallpox for a camp hand, and finally of appendicitis for myself, in two weeks, and simultaneously an absolute lack of even enough men to get the camp equipment out of Baguio effectually prevented any carrying on of the work; but after that date work was resumed and prosecuted steadily until the advent of the rainy season.

Triangulation stations were put up, the topography of the country affording excellent sites, and were tied in with the Benguet road survey stations, and from them the togography carried on in the usual manner.

The weather as a whole was excellent for survey work, and even the occasional bad days could be used to plat some of the data needed in the field and to reduce the field notes, so that I was able to return to Manila with notebook completely up to date.

Toward the last day of May and the first of June some attention was paid to the geology and ore deposits of the Antimok region, which up to date were set aside for the completion of the work of first importance. All the tunnels and openings of this district were surveyed and platted, such information as to the geology as could be hastily obtained was gathered, and about 25 samples of rocks and ores were collected to be brought to Manila for examination and analysis. In accordance with your instructions and at the request of Messrs. Petersen and Reavis, three days were spent at the stamp mill they have lately put into operation to aid them in the milling, if possible. It was found that while the spirit and energy of these gentlemen are most praiseworthy, and could well be duplicated by others, that they are struggling under adverse conditions due to lack of knowledge of the work, and such information and help as I could give were furnished. Details of feed, stamp drop, water, oil on plates, and so on were attended to, and such advice as I was capable of was given. I understand

that the latter has been acted upon—a plate of 18 feet instead of the 18-inch one in place has been ordered—the mill is to be steadied and better arrangements to be made in general. Even under the present crude conditions I should judge that possibly the mill plated $10 to the ton during this run, which is an excellent indication of ultimate success.

A visit was made to the Batwaan Creek mining region, but it was found deserted, and as we had no food with us it was necessary to return to camp. Several efforts were made to connect with the parties interested in this region to no avail and, therefore, it was necessary to forego the examination desired.

One visit was made to claims in the "Bued River" region, the "White Horse" and "Grey Horse" of Mr. Petersen, and the outcrop examined. Owing to the early advent of the rainy season the plans for spending some time at this district had to be changed and postponed for the geological reconnoissance in the fall. A heavy storm commenced about the month of June and lasted until the party left Baguio on the 22d. So much rain fell that it was impossible to carry on further work, and so packing was commenced about the 19th.

Before leaving Baguio I obtained, in accordance with your instructions, lists of claims, workings, etc., the plans of the respective holders as far as they could be obtained, and considerable notes as to the ore deposits and geology in each case. At Twin Peaks I made an examination of the map of the Benguet road surveys, traced those to be used in my work, and obtained other information which will be of use in the preparation of my final report on this region. All this was most cordially given by Col. L. W. V. Kennon, and later by Mr. G. H. Hayward, in successive charge of the road.

Some little delay ensued in getting out of Baguio, but on June 22 enough polistas were procured through the friendly services of a Chino, and the trip made through into Manila in three days, arriving Sunday, June 22, by the same route as going.

Respectfully submitted.

A. J. EVELAND,
Geologist Mining Bureau.

Mr. H. D. MCCASKEY,
Chief of the Mining Bureau, Manila.

EXHIBIT C.

NARRATIVE REPORT OF WORK IN BATAN ISLAND, ALBAY, BY W. D. SMITH, B. S., M. A., GEOLOGIST.

MINING BUREAU, *Manila, June 17, 1905.*

SIR: In compliance with your instructions of March 13, 1905, and June 16, 1905, I have the honor to submit an advance report on the work assigned to my charge on Batan Island, Albay Province, and adjacent territory during the months of March, April, May, and a portion of June.

According to instructions the work was that of collaboration with Lieut. H. L. Wigmore, in charge of exploration of coal deposits on the United States military reservation on Batan Island and that of obtaining all necessary information, including maps, samples, etc., for a complete report on the economic, paleontologic, and geographic geology of this region as far as time and funds have permitted in working over so large a territory.

On March 18, with the proper field equipment, the geologist proceeded to Liguan, Batan Island, by U. S. C. T. *Lal-Loc*, arriving there on the morning of March 23, where he was met by Lieut. H. L. Wigmore, whose mess he shared during his stay on that island.

The first day was spent with Lieutenant Wigmore in looking over the material and results of his previous work. The next day First-Class Private John R. Yeager, of the Corps of Engineers, and one native were detailed to the geologist as assistants during his entire stay. These men were found very efficient in their respective work. Private Yeager was invaluable in the prosecution of the work, as he had done practically all the instrument work on the military reservation.

In every way Lieutenant Wigmore assisted and made the geologist's first work in the archipelago a thing to be always recalled with pleasure. Without his able work in one of the most difficult pieces of exploratory work the writer has yet seen anywhere, much valuable data would not be available to commerce and science.

Lieutenant Wigmore also assisted in obtaining barotas when the launch *Atlanta* could not be spared and bolomen with whom to attack the jungle, which is particularly rank on this island.

The first two weeks were spent in getting a general idea of the region as a whole and in reviewing the work done by Lieutenant Wigmore and his corps of engineers. This latter work was done chiefly on Sundays and in the evenings. It was found, however, that even the most cursory examination could not be made in that time owing to the great difficulty in getting over the country. If we left the shore it was as a rule with one or two bolomen, and on reaching even the highest eminences and climbing trees we could see practically nothing of the surrounding country.

After this preliminary work we started with the triangulation work of the Coast and Geodetic Survey and the more detailed work done by Lieutenant Wigmore and his assistants as a basis, and instituted a series of traverses crossing the island in various directions along streams and around the coast.

During the progress of this work we found it impossible to get back to our headquarters at night, though we were many times only a matter of a mile or so away, so that we generally stopped with the tenientes of the various coast barrios. At all times we found the natives friendly and very hospitable, willing at all times to render any and every assistance. In return for these courtesies we endeavored to help many of them in learning English.

These people belong to a distinct tribe known as Bicols, for the most part peace-loving people and thrifty.

For perhaps a month or six weeks work was confined to the military reservation, as this was the prime object of the visit to Batan Island. Here the geologist was particularly impressed with the efficiency with which army men—officers and soldiers alike—undertake propositions that are as a rule handled by men who have been specially trained in one thing. Everyone, extending even to the clerical force of whom Mr. W. H. Penny is chief, seemed imbued with enthusiasm for the work going on.

Here were found two diamond drills, unfortunately of limited capacity, at work under the supervision of experienced men from the United States. This is the first instance, to my knowledge, of the employment of the diamond drill for mineral exploratory work in the archipelago. The coal here on the reservation improved in quality and appearance with every foot of drilling and tunneling, so that the broken and slicken-sided appearance of the surface coals largely disappeared with depth.

After Lieutenant Wigmore's report had been completed and submitted, attention was turned to the eastern end of the island, where three properties were examined—the Batan mine, mere prospect tunnels as yet; on ex-Governor Betts's claim, the Chifladura, now in operation under the Japanese contractor, Mr. Ikeda, and belonging to the Batan Coal Mining Company, and the Bilbao, same company, now abandoned. At the Chifladura the output is 22 tons per day (twenty-four hours of three shifts).

Conclusions, which must necessarily be conservative at this time, are that the Liguan seams are in a lower geological horizon than those of the eastern beds and hence better. I found other factors, such as transportation, harborage, proximity to sea level, etc., favoring the deposits at Liguan.

During the reconnoissance on the eastern end of the island, iron ore (hematite and limonite with some magnetite) was found, and samples were collected from which analyses are being made.

When the more or less detailed reconnoissance of Batan Island had been completed a trip was made to the island of Rapurapu. Nearly a week was spent on this island, which proved to be very interesting geologically and may also prove so economically. The iron formation of Batan was found to continue on this island. Statements with regard to its extent, thickness, and quality will be made in the forthcoming final report. At the pueblo of Rapurapu a guide was obtained, and early in the morning of the 24th of May the party set out in a baroto along the south shore, disembarked about 3 miles east, and took a trail over the mountains to a reported gold mine. It has since been learned that the native did not take us to the old shafts, but to a place where placer work has been carried on. There reigns among these people a great fear of entering mines, and particularly one in which, as in this case, a number of men had lost their lives. These shafts can no longer be entered I am told, so that probably nothing much was missed.

In the stream bed a color was obtained after only a few minutes' panning. The rocks here are metamorphic schists and plutonic rocks, chiefly diorite.

After a trip across the island to the north shore and some study in that portion our party proceeded across the strait to Gotbo, the scene of former extensive coal

mining on the part of the Spaniards. But first it should be mentioned that one outcrop of coal was located on Rapurapu on the low plain in the vicinity of the pueblo of the same name. The coal does not appear to be good, and is only important for purposes of correlation.

At Gotbo examination was made of the old Spanish workings, now abandoned and in a sad way—another case of extensive preparations, great enthusiasm, and lack of proper superintendence.

This work concluded, the party returned by baroto to Batan.

During the following week a similar reconnoissance of Cacraray Island, lying to the west of Batan, was made with the following objective points: (a) The general geology; (b) prospecting for coal; (c) preliminary survey of route for proposed railroad from Legaspi to Coal Harbor.

The following week was spent mainly in reconnoissance work on the "mainland" in the vicinity of Mayón volcano. A trip was all arranged for by Captain Castner, Fourth Infantry, U. S. Army, and the geologist, for the ascent and geological study of this interesting and difficult volcano. However, the transfer of the Fourth Infantry just at the time set postponed this trip indefinitely.

The courtesy of the officers of the Fourth Infantry, and the civil authorities and citizens of Albay Province, and their interest and assistance in many ways, were very gratifying to the geologist in his work in this neighborhood.

Owing to the lack of further funds and unavoidable difficulties in regard to transportation by land and water, much work that might have been carried on had to be abandoned until a more favorable time. However, a continuation of work in this field is promised at no distant date.

With this preliminary work completed, all available maps, mine plats, collections of rocks, fossils, coal samples, etc., made, the party was disbanded and the geologist embarked on the U. S. C. T. *Lal-Loc* the afternoon of the 12th of June and proceeded to Manila, arriving there the morning of the 15th.

Work is now being done on the preparation of the geologist's final report, which will be a treatment from the following main points of view, according to instructions of the chief of this bureau:

1. Field work: Purposes, plans, area covered, etc.
2. Geography: Location, area, trails, streams, chief towns, important barrios, water transportation, harbors, etc.
3. General: Climate, vegetation, timber, population, characteristics of people, etc.
4. Hydrography: Streams, water supply, drainage, etc., with special reference to mining operations.
5. Topography: Features of country, orography, watersheds, with special reference to development by road, railroad, water transportation, etc.; altitude, slopes; maps, profiles, and sketches.
6. General geology: Igneous, metamorphic, and stratified areas; volcanic activity and remains; fossils, distribution of; geological structure, folds, faults, dikes, etc.; geological horizons, with special reference to coal deposits; maps, sketches, sections.
7. Rocks: Petrographic and lithological notes and data; descriptions, determinations of rocks and discussions.
8. Coal deposits: Occurrence, relations, thickness, pitch, quality, etc.
9. Present methods of mining and treatment: With sketches, plans, etc.
10. Other nonmetallic mineral resources: Location, extent, relation of deposits to geological environment, analyses, discussions.
11. Mines and claims: Names of locators, owners, or lessees; output, plan for development, and all important phases of the situation.
12. Summary: Estimate of values; assays and analyses, and discussions; suggestions as to development; discussions of labor, transportation, supplies, costs, methods of mining and shipment. General.

During the prosecution of the field work nothing more than the physical features of the country impeded the work and not a day was lost through sickness.

Batan Island is doubtless one of the most healthful and beautiful spots in these islands. The geologist is very much encouraged over the conditions affecting mining and geological work in the archipelago, conditions which are continually being exaggerated and misrepresented by parties whose examinations have been necessarily superficial.

Respectfully submitted.

W. D. SMITH, B. S., M. A.,
Geologist, Mining Bureau.

MR. H. D. MCCASKEY,
Chief of the Mining Bureau, Manila.

EXHIBIT D.

REPORT UPON THE BULACAN IRON INDUSTRY, BY MAURICE GOODMAN, E. M., FIELD ASSISTANT.

DEPARTMENT OF THE INTERIOR,
MINING BUREAU,
Manila, September 1, 1905.

SIR: In accordance with your written instructions, dated August 4, 1905, I have the honor to submit herewith a report upon the present condition of the iron industry in the Angat region, statistical information regarding cost and amount of production for the calendar year 1904, and a report upon the probable opportunities of the extension of the iron industry in the Angat district.

The report is based upon information obtained by me during a six days' visit to the district. I left Manila on the morning of August 8, arriving at Baliuag the same morning; there hired a carromata and drove to Angat, arriving there about four and a half hours after leaving Manila. The following morning I left Angat on foot and reached the region of the iron mines in the afternoon, after about four and a half hours of actual traveling. The trail, which was almost entirely uphill from Angat, was muddy and in rather bad condition owing to recent heavy rains. The two following days were occupied in visiting the working places of the different mines and in obtaining data required, both from my own measurements and from information supplied by the operators of the different blast furnaces.

On the fifth day after leaving Manila, I returned to Angat and spent the afternoon of this and the morning of the last day in interviewing the owners of the iron mines, all of whom live in Angat. All of them allowed me to look over their books, but in nearly every instance their accounts had been begun since January 1, 1905 (prompted thereto by the enforcement of the new internal-revenue act), and were therefore of little value to me. In the future, however, these books will be of material assistance in securing statistical information.

At the time of my visit to the mines, only 2 furnaces were in actual operation. Of these, that of Francisco Vergel de Dios on the Constancia claim, was blown in during my visit to his camarin, and the other, that of María Fernando, on the Hison claim, was expected to be run for another week before lack of charcoal caused it to be blown out. Three more furnaces in the district, that of José Ong Sayco, that of Mariano Santiago, and that of Mariano Suarez, although not working at the present time, are only temporarily idle for lack of labor, fuel, or funds. Altogether, therefore, the Angat iron mines support at the present time 5 blast furnaces, working intermittently throughout the year.

There are at the present time 14 mining claims held in the Angat iron region, 4 of which are concessions granted during the Spanish régime, and the remainder are claims located under the present existing mining laws. Only 2 claims are worked at present. One of these is the Constancia claim and supplies ore to the furnace of Francisco Vergel de Dios, who now owns both claim and furnace, having recently inherited both from Pedro Otayco. The other claim feeds all the other 4 furnaces when they are in operation. Its ownership is disputed by Mariano Santiago, Mariano Suarez, and María Fernando. At present all these claimants, as well as José Ong Sayco, are taking ore from the same river bed, each claiming it to be within his or her concession. Only Ong Sayco has recognized the claim of María Fernando and is paying her a tribute of ₱50 annually for the privilege of taking ore from her concession.

Up to the present the average monthly production for 1905 is approximately 19,150 pounds, about 6½ per cent less than the average monthly production of last year. This falling off is due to the closing down of all operations during the month of June, caused by the presence and fear of a band of ladrones who terrorized the district for a short period. This band has since been broken up and the furnaces are again working at their normal rate.

The cost of production of the products of the Angat blast furnaces may be divided into the following items: Mining (stripping, transporting to Camarin); smelting (charcoal, labor, repairs, molds); transportation; taxation (internal revenue, territorial; internal revenue, ad valorem).

MINING.

To keep one furnace constantly supplied with ore, it is necessary to employ in stripping—

	Per day.
Six men, at ₱0.30 each	₱1.80
One maestro	.50
Total	2.30

For a year of 250 working days, ₱2.30 × 250 = ₱575.

A single furnace, turning out about 560 pounds of castings per day, requires in the neighborhood of 1,140 pounds of ore and about 1,500 pounds of charcoal during the same period. The cost of the transportation of the ore, from the mine to the Camarin, a distance of about a quarter of a mile, is ₱0.20 per load, which consists of a split bamboo pole carrying 2 baskets loaded with hematite bowlders weighing about 130 pounds per load.

For a year of 250 working days, or 12 workings of the furnace for periods of 20 to 21 days each, the cost of the transportation would be $\frac{1,140}{130} \times 250 \times ₱0.20 = ₱438$.

SMELTING.

The first and most important item which enters into the cost of smelting is the cost of charcoal, the only kind of fuel employed for the purpose in this district. It is usually manufactured by the operators themselves, part of the labor required, however, being paid for by contract. The approximate cost of production of a stack containing about 144 cubic meters of wood, reducing to about 115 cubic meters, or 2,553 bushels of charcoal weighing 5,160 pounds, is as follows:

Cutting about 3,000 logs, various sizes	₱70.00
Transporting same from forest to Camarin	60.00
Cutting and transporting to Camarin small sticks (about 55 talacsanes)	27.00
Transporting timber from Camarin to stack and building up of same (per contract)	58.00
Laborers employed during combustion	28.00
Uncovering and removing charcoal from stack after combustion	25.00
Transporting charcoal from stack to Camarin	26.00
	294.00
Forestry tax (last year ₱57.60)	46.80
Total	340.80
Rate per ton of 2,000 pounds	13.35
About 8 such stacks of charcoal will be required yearly for a furnace working 250 days, making the total cost of charcoal per year	2,726.40

Daily cost of labor.

2 maestros, at ₱0.75 each (this includes cost of subsistence)	₱1.50
1 molder (this includes cost of subsistence)	.58
4 blowers, at ₱0.50 each	2.00
10 ore breakers, at ₱0.25 each	2.50
Total	6.58
For 250 working days	1,645.00
Cost of clay molds (left in plow points)	75.00

TAXATION.

Other than the forestry tax paid for cutting the timber used in making charcoal, mine owners and operators also pay two kinds of internal-revenue tax, namely, a territorial tax on mineral concessions and an ad valorem tax on the metal product. The first of these is at the rate of ₱100 per 60,000 square meters, and the second is 3 per cent of the market value of the product. The internal-revenue tax went into effect January 1 of this year, and supplanted the old industrial tax, which operators formerly paid, of ₱60 for each blast furnace. It is perhaps too early to mark the effect, if there be any, of this new tax on the industry. I know of only one who had, up to the time of my visit to Angat, paid the territorial tax, in spite of the fact that the law states that the tax shall be paid yearly in advance, and that

any concessionaire who fails to pay the tax shall forfeit his right to the mining concession (Art. XV, Act No. 1189, U. S. Philippine Commission).

None of the owners complained of or criticized the imposition of this new tax, though they would, of course, all have been better contented with the former schedule. María Fernando, the only operator who up to the time of my visit to Angat had paid the territorial tax, did complain, however, that she had been given to understand that when the new internal-revenue tax went into effect she would be allowed to cut timber on her concession for the purpose of charcoal making free from taxation. Up to the present, however, though she had paid the territorial tax which amounted to ₱686.33 in her case, she had to continue to pay the forestry tax as before. She said that she did not so much object to the cost of the forestry tax as to the trouble, delay, and annoyance which the collection of it involved. This, she admitted, had greatly ameliorated since the appointment of the present montero of Angat. She has since applied for a gratuitous license under section 17 of the forestry act, by the provisions of which she is seemingly entitled to exemption from the forestry tax.

With respect to the 3 per cent ad valorem tax, but one operator so far has paid it, although again, Article XV of Act No. 1189, United States Philippine Commission, distinctly specifies that the ad valorem tax shall be paid before any of the products of the mine may be removed. This operator has recently written to the collector of internal revenue asking for his opinion on the question of whether or not the operators or the Angat iron region are exempt from the payment of all internal-revenue taxes. Their claim thereto is based on section 60 of the act of Congress of July 1, 1902, in connection with articles 1 and 2 of the Spanish Royal decree of November 21, 1895. This decree (Abstract of the mining laws in force in the Philippine Archipelago, compiled by Charles H. Burritt, p. 95) extends the period of exemption from annual fees enjoyed by iron and coal mines and postpones the impost of the 3 per cent ad valorem tax until 1917. Section 60 of the act of Congress reads: "That nothing in this act shall be construed to affect the rights of any person, partnership, or corporation having a valid, perfected mining concession granted prior to April 11, 1899, but all such concessions shall be conducted under the provisions of the law in force at the time they were granted, subject at all times to cancellation by reason of illegality, etc." Whether or not the exemption by Royal decree extended until 1917 may be considered a right of the concessionaires is a question to be decided. This is a matter of considerable importance to the future iron and coal industries of the Philippine Islands and should be definitely settled. Up to the present it is believed the collector of internal revenue has not expressed his opinion on the question, it having been referred to him but a few days ago by one of the operators of Angat.

TRANSPORTATION.

One of the most important factors entering into the cost of production is the cost of transportation of the iron plowshares and points from the mines to Manila. Three modes of transportation are required, beginning with the cargador from the smelter to Angat, a distance of about 15 miles; then by bull carts to Baliuag, a distance of about 12 miles, and finally by railroad to Manila. The first stage is naturally the most expensive, and costs at the rate of ₱0.80 (formerly ₱1) per 10 pairs of points and shares of whatever size, averaging about 7.9 pounds per pair. From Angat to Baliuag by bull cart the rate is ₱2.50 a hundred pairs, averaging 6.8 pounds per pair, the reduced average weight being due to the fact that now a single large share is considered as equivalent to a pair of smaller ones or to a pair of points. During the dry season the iron is sometimes sent to Baliuag by banca at the rate of ₱2 per 100 pairs, averaging 6.8 pounds per pair. This method of transportation, however, is not as reliable, being possible only during short periods of the year, and therefore is not much used. By rail from Baliuag to Manila costs ₱1.50 per 100 pairs, averaging 6.8 pounds, and from the railroad station to the dealers in Manila costs about ₱0.65 for the same load.

COST OF TRANSPORTATION.

	Pounds.	Cost.	Per 100 pounds.
From smelters to Angat	79	₱0.80	₱1.013
From Angat to Baliuag	680	2.50	.368
From Baliuag to Manila	680	1.50	.221
From station to dealer	680	.69	.096
Total cost per 100 pounds	.....	.....	1.698

But few supplies are sent from Angat to the smelters in the mountains. The most important of these is rice for the subsistence of those laborers part of whose wages are paid in this commodity. The present cost at Angat per cavan (about 2⅔ bushels, weighing about 125 pounds) is ₱4.50, and the cost of transporting the same to the mines is ₱1.25.

The following table gives an idea of the relative average costs per year of producing and marketing about 20,600 pairs of plow shares and points, weighing approximately 140,000 pounds, in a typical blast furnace in the Angat region, working 250 days:

	Per year.	Per 100 pounds.	Per long ton.	Per cent.
Mining	₱575.00	₱0.411	₱9.21	6.2
Transportation of ore to furnace	438.00	.313	7.01	4.7
Charcoal	2,726.40	1.947	43.61	29.4
Smelting and molds	1,720.00	1.229	27.53	18.6
Transportation to Manila	2,377.20	1.698	38.04	25.7
Internal-revenue tax on 1 pertenencia	250.00	.179	4.01	2.7
Internal-revenue tax 3 per cent ad valorem	333.54	.238	5.33	3.6
	8,420.14			
Incidentals, 10 per cent	842.01	.601	13.46	9.1
Total	9,262.15	6.616	148.20	100.0

The market value of the product is assessed at the rate of ₱54 per 100 pairs of points or shares.

Market value of product	₱11,124.00
Total cost	9,262.15
Profit	1,861.85

PRODUCTION FOR CALENDAR YEAR 1904.

Operator.	Weight.	Charcoal consumed.	Value of product.
	Short tons.	*Short tons.*	
María Fernando	71.469	204.2	₱12,238.50
Francisco V. de Dios	24.071	69.1	3,950.53
Mariano Suarez	18.426	52.8	2,737.80
Mariano Santiago	8.934	25.6	1,243.31
Ong Sayco	.....	.....	.....
Total	122.900	351.7	20,170.14

The above figures are close estimates based chiefly upon the records of the montero of the district, and such other reliable data as was obtainable from the proprietors. Only one of the operators kept a book giving full and detailed items of income and expenditure. Such estimates as the proprietors were willing to give were, it was suspected, mostly incorrect, and therefore not utilized. For example, one of the biggest operators in the district, in answer to inquiries as to his output, produced a copy of his declaration to the provincial treasurer of Bulacán, in which he states that between July 4, 1901, and the end of December, 1904, he produced in all about 6,000 pairs of shares and points. Yet from the amount of charcoal burned by him last year it was estimated that his output last year alone was nearly equal to the output declared by him for the two and a half years, and his own records, which he has been required to keep since the introduction of the internal-revenue law, showed that during the first six months of this year he has already produced and sold 2,300 pairs.

The value of the output varies considerably with the time and place where the iron is sold. Some of the operators draw their money in advance, or practically borrow a sum of money from the dealers in iron, and then repay in stock, for which they naturally obtain a much lower figure than if sold directly. This accounts for the large discrepancy in the value of the output of the different operators.

EXTENSION OF INDUSTRY.

The probable opportunities for the extension of the iron industry in the Angat region are very difficult to determine at present, owing to the fact that much important data, which are necessary for a full and complete discussion of the subject, are lacking. For example, although nearly all the known outcrops of iron ore in this district were visited, the information derived thereby is insufficient to offer even a suggestion as to the available ore supply. The outcrops observed were anywhere from a quarter to two miles apart, and were all so massive and hard that the native miners, using nothing but picks, hammers, and bars, were unable to work them. Their ore supply is derived entirely from boulders, which have been worn and broken from the outcrops, and which the miners to-day simply dig out of the creek bottoms, break into convenient sizes, hand-sort, and send to the furnaces above. No development work having been done upon the seams themselves, the average depth, strike, thickness, and general character of the deposit or deposits being therefore undetermined, it is impossible to give any figures whatever regarding the amount and value of the available ore supply.

The question of ore supply has never troubled the local operators for the reason that the cost of erection of one of their furnaces is extremely small, their output also very small, and their faith sufficiently large to trust that the creeks which have been supplying them and their ancestors with ore for nearly a hundred years will continue to do so at least during the life of their furnace. A comparatively large blast furnace, such as the hypothetical 10-ton furnace you suggested in your letter of instructions, would consume per year nearly thirty times as much ore as did all the furnaces together during 1904, and its cost for fire brick and erection alone would be more than three times the cost of any furnace (excluding the Camarin) in operation in the Angat region to-day. I would, therefore, suggest that before going to the expense of the erection of a large blast furnace in the region, it would be highly advisable to institute a system of exploration which would afford as much and as definite information as possible regarding the extent, character, and value of the deposits. This need not necessarily be an expensive undertaking, for the prospecting may be done either by the diamond drill or by sinking and drifting in the seam itself. While the former method may be much the quicker, the latter would yield fuller and more detailed information than could be derived in any other manner, while at the same time the ore taken out in drifting would pay the expenses of the exploratory work.

Assuming the information derived from such exploratory work to be satisfactory, the plant no doubt would be erected close to the mines, thereby saving to a large extent the cost of transportation of the ore, as well as of the fuel, which is abundant in the neighborhood. Its exact location would depend largely upon the result of the exploratory work, on the topography, and on the method of mining decided upon. If it is proved, as seems probable, that the main deposit lies in Mount Maon, and if it is decided to open the mine either by vertical shaft from above or by tunnel below, a good location for the plant could be found on the hill above the Hison outcrop. Here plenty of water and abundance of timber is available at present, the main trail from Angat could be easily extended to the plant, and there is sufficient drop and space for a slag dump.

In accordance with your suggestion, I submit in connection with this report a design of an improved blast furnace which may be erected in the iron regions of Bulacán at a very reasonable figure, its capacity to be about 10 long tons per twenty-four hours. It is designed with an eye chiefly to simplicity of construction, and, bearing in mind the difficulties of transportation, as little foreign material and appliances as practicable are introduced. It is circular in plan, the diameter at the crucible being 4 feet, at the boshes 8 feet, and at the throat 5 feet. Height from the bottom of the crucible to the throat 31 feet. It is designed to be charged by hand, the charge consisting of ore, limestone flux, and charcoal. The hot gases escaping from the furnace are to be allowed to run to waste through a chimney 9 feet high built over the throat. A cold blast introduced through three tuyères is to be used. Further details may be seen in the accompanying design.

The design would unquestionably be greatly improved if provisions were made for water cooling at the boshes, tap holes, and tuyères. As it is, the most vulnerable parts of the furnace will probably have to be replaced and repaired much oftener than they otherwise would. Labor and material, however, being inexpensive, unless it becomes necessary to blow out the furnace, the annual cost of repairs will not be very large.

An approximate cost of material and erection of the furnace would be:

Foundation	₱1,100
Shaft	1,850
Columns	200
T-bars, bands, and doors	560
Air pipes and tuyères	75
Miscellaneous	300
Total	4,085

The following table is the result of inquiries of the local dealers and consumers regarding the amount, quality, and value of the pig iron which was imported into the Philippines during the fiscal year 1905:

FOUNDRIES AND DEALERS.

Grade.	Long tons.	Value in pesos per long ton in Manila.
No. 1	275	50.00 to 55.00
No. 3	225	48.00 to 58.00

UNITED STATES NAVY.

No. 1	50.2	34.00 to 37.40
No. 2	225.0	29.40 to 36.40
No. 3	250.0	28.40 to 36.50
Assorted	235.8	26.00 to 55.00

The total value of the 761 tons of pig iron imported by the United States Navy during the fiscal year 1905 was ₱2,739.60, making an average of ₱31.60 per long ton. This figure does not include the cost of freight, lighterage, nor customs duties.

From the foundrymen interviewed it was learned that the importations during the last two or three years have fallen off fully 50 per cent of what they had been for the three years previous to 1901. This is probably but the natural reaction following upon a period of unusual business activity, stimulated by and attendant upon the presence of large military and naval forces in the islands during the years 1898 to 1901. Those who have been in the islands previous to 1898 admit that the conditions of the iron trade are better to-day than they had been previous to American occupation. However, many complain that unless a piece of work is urgently needed the order is usually sent to Hongkong or Shanghai, where labor, supplies, and other expenses are cheaper, thus enabling the foreign foundries to underbid the local ones.

A piece of cast iron broken from one of the plowshares made at Angat was shown to several foundrymen, and they without exception considered it a good workable cast iron and believed that if it could be brought to Manila in pigs at a price equal to what they were paying for the imported kind it would have a ready market, though perhaps a small one owing to the small demand. However, in view of the figures obtained from the third special report of the collector of customs for the Philippine Islands, which show that over ₱4,800,000 worth of steel, wrought iron, and cast iron, and articles manufactured from these metals, were imported during the fiscal year 1904, it would not seem improbable that if a dependable supply of pig iron of a good grade were available in the Philippine Islands an increased demand for the same might be created.

To give any figures as to what the probable interest on the investment would be is a difficult matter, in view of the many unknown quantities which are essential to even an approximate solution of the problem. For instance, it is at least necessary to know what the character and the market value of the product is to be.

It has been shown that under existing conditions a furnace operating 250 days in the year, and turning out about a quarter of a ton of iron per day cast into shapes of plowshares and points, would make a net profit of about ₱1,861.85 on a total cost of ₱9,262.15 for production, or about 20 per cent profit. But a large furnace, turning out about 10 tons of metal per day, if cast into plowshares and points alone, would in a very short time flood the market and find the sale of its product impossible. To produce pig iron alone—a product which could be more readily disposed of in Manila—would cost practically as much per ton as it does to produce plowshares. But while

the latter can be sold in Manila at the rate of about ₱183.80 per long ton, it would be difficult to dispose of pig iron at more that ₱55 per long ton.

The cost of production and marketing under present conditions is about ₱148.20 per long ton. Of this, the cost of charcoal alone, which is consumed at the not too excessive proportion of about 2.8 tons per ton of iron, is ₱43.61 per ton of iron produced, and the cost of transportation from the smelter to Manila is ₱38.04 per ton. These two items alone amount to ₱26 in excess of the selling price of pig iron in Manila. It is undoubtedly true that the cost of transportation could be very largely diminished by the construction of either a wagon road or some mechanical means of transportation, such as wire rope overhead tramway, between the smelters and Angat. In fact, an improved mode of transportation would be absolutely necessary to a new 10-ton furnace, for even now, although the combined product of all the furnaces is but one-thirtieth of the proposed output from the projected furnace, operators frequently find considerable difficulty, especially during the planting season, to obtain sufficient cargadores and laborers.

The smallest practical rope tramway which could be constructed would cost in the neighborhood of ₱35,000, and would have a normal capacity of about 50 tons per day. It would reduce the cost of transportation from the smelters to Angat from ₱22.70, the present cargador rate, to about ₱3 per long ton. On a wagon road for the same distance the cost of transportation would be about ₱10 per long ton, and the construction of such a road would cost in the neighborhood of ₱20,000. As stated before, some improved method of transportation would be absolutely essential, not only on account of increased economy, which, however, would be ample reason in itself, but also because it would be impossible to obtain sufficient cargadores to transport the product as it is done to-day.

It is evident that, even after deducting whatever economies might be effected in the cost of transportation, the total cost of production and marketing would still remain largely in excess of the selling price of pig iron in Manila, and that to build up an industry for the manufacture of pig iron in the Angat region must prove an unprofitable undertaking. But I believe that a profitable foundry practice could be built up to manufacture special castings as well as regular shapes, such as cast-iron pipes and fittings. Special castings of simple design cost ₱0.15 per pound in Manila, and ordinary cast-iron pipes cost about ₱0.11 per pound, while the plow shares and points which are brought down from Angat sell for only a little over ₱0.079 per pound and cost to produce and to market only ₱0.066. In addition to this, as produced at present from high-grade ore, in small charcoal cold-blast furnaces, the resulting iron is of a high grade and freer than the imported stock of those detrimental elements which tend to reduce the value of cast iron. An important advantage possessed by the Angat operators is the fact that, owing to the unusual purity of the product of their furnaces, they are able to cast directly from the molten metal obtained from the blast furnace without having to go through the costly intermediate process of remelting in a cupola.

Unfortunately, it is impossible to determine from the custom-house reports what portion of the iron products imported are of cast iron and of such shapes as to be readily manufactured in the islands. But it seems quite probable that, although under present conditions the establishment of a profitable industry for the manufacture of pig iron would be impossible in Angat, with an annual importation of nearly ₱5,000,000 of iron and steel products a profitable, even if small, foundry business could easily be built up.

Respectfully submitted.

MAURICE GOODMAN, E. M.
Field Assistant, Mining Bureau.

Mr. H. D. MCCASKEY,
Chief of the Mining Bureau, Manila.

EXHIBIT E.

REPORT UPON BUILDING STONE NEAR MANILA, BY H. M. ICKIS, E. M., FIELD ASSISTANT.

MINING BUREAU, *Manila, March 20, 1905.*

SIR: In compliance with instructions from you under date of January 31, 1905, I have the honor to submit the following report with respect to my recent field work in the provinces of Laguna and Rizal.

The object of this trip is outlined in the above instructions and was "to ascertain whether or not there is a stone within the region outlined of sufficient quantity, of fair quality, and of favorable location with respect to quarry sites and transportation for the establishment of quarries to be worked by convict labor" and to make geologic notes of general interest.

ITINERARY.

I left Manila on the launch *Mabait* of the Yanco Line at 7 a. m. on February 2 and arrived in Los Baños six hours later. After presenting my letter of introduction to First Lieutenant Thomas, First Cavalry, U. S. Army, in charge of the rock-crushing plant and road work at Los Baños, I visited, in turn, the quarry and rock-crushing mill, the Dampalit River as far as the first falls, the cuts in the road to Calamba, and the clay beds of Paja Arroyo on the south side and the low hills on the east side of Mount Maquiling.

From Los Baños transportation was by boat to Santa Cruz, which was used as a base while investigating the region near that arm of the lake. You joined me at Santa Cruz on the evening of February 7, and during the two following days a journey was made to the beautiful Pagsanjan Canyon, then by way of Cavinti and Luisiana to Botocan Falls, returning by way of Majayjay and Magdalena.

It was found necessary to spend one night in Paete. Paquil, Pangil, and Siniloan were then seen, and on February 11 return was made to Santa Cruz by banca, touching at Mataquio.

Transportation from Santa Cruz to Jalajala was by banca via Bagombong. One day was spent among the hills east of Jalajala and on February 14 I took a banca for Tanay, following closely along the shore.

After a tramp over the hills near Tanay a banca was taken to Morong, where I obtained another banca to Subay, Talim Island.

In company with Mr. Haygood, the engineer in charge of the city quarry at Subay, I circumnavigated Talim Island by banca on February 16, and on the 17th the launch *Comandante* was boarded for Binangonan.

After inspecting the rock exposures along the lake shore, the site of the old quarry of the city of Manila, and the limestone on the road to Antipolo, return was made to Manila on the *Comandante* on February 19.

NOTES.

The quarry at Los Baños, from which Lieutenant Thomas obtains rock for the roads under his supervision and for shipment to Fort McKinley, is situated on the east wall of Dalampit Canyon, about half a mile southwest of the Los Baños pier.

The working face is 200 feet long and nearly 100 feet high. Its length can easily be increased, and it will soon be 200 feet high, provided the present base level is adhered to. A streak of soft ashy rock about 50 feet wide divides the present face into two equal areas.

The rock, a feldspar porphyry (f. n.), quarried is vesicular, is not uniform in composition, and has no regular parting planes. In some parts of the quarry the rock has a distinctly banded structure, as shown in sample No. 1.

The rock is broken down first by large blasts, and then further broken by plaster blasts, and finally reduced to crusher size (7 inches or less) by hand sledges. The crushing plant is located on the low river bottom land about 200 yards northwest of the quarry. It consists of a No. 3 Gates gyratory crusher, a revolving screen and the necessary engine, boiler, feeding and shoveling platforms. The capacity of the crusher with this rock is 90 tons to 2½-inch size per day of nine hours. The screen separates out fines for surfacing the roads, besides the regular 2½-inch road metal. Transportation of the rock to and from the mill is by four-wheeled wagons, with American horses and drivers. Rock for Fort McKinley is hauled to the pier and dumped directly into scows. More than 300 native laborers are employed on the road work and in the mill. They are paid 50 cents per day (Philippines currency), while the Filipino foremen receive 1 peso. A large proportion of the laborers come from Batangas.

The Dampalit Falls are approximately three-fourths of a mile from the mouth of the river of the same name and nearly a mile southwest of Los Baños. At the falls, which are between 60 and 70 feet high, the river flows in the direction north 30° west, but its general direction is nearly due north. Trees of considerable size and a tangle of undergrowth cover the sloping sides of the canyon, which are necessarily much higher than the waterfall.

The rock at the falls closely resembles that found at the quarry near the mouth of the canyon. It is very irregular in appearance and composition, but all consists of

a dark-brown mass with light-colored phenocrysts of feldspar, and would be called a feldspar-melaphyre (f. n.). It breaks in irregular shapes and much of it is vesicular, while it lacks nearly all the qualities of a good building stone (samples Nos. 2 and 3).

There is a 30-foot cut about a mile from Los Baños on the road to Calamba which Lieutenant Thomas is constructing where the road cuts through a spur of Mount Maquiling. The top of the ridge in which the cut is situated consists of volcanic tuff, but the lower 20 feet is mainly composed of a harder volcanic rock intermixed in its upper portion with the softer tuff. This rock, a feldspar-melaphyre (f. n.), breaks out in small irregular bowlders. It makes a fairly good road metal, but is not a dimensional stone. Specimen No. 4 is a sample of the rock.

In the Paja arroyo, about 3 miles west of Los Baños and 1½ miles from the lake, occurs a deposit of white clay, which at present is being mined, sacked, and carried on the backs of natives to the Los Baños road; thence it is carted to Los Baños and shipped to Manila.

The arroyo is quite heavily wooded with hard-wood trees of large sizes, and no clearing has been done.

The method of working is to sink pits about 3 feet square and 10 feet deep and then to run out low drifts into the best clay. At the time of my visit there were two groups of these pits, one on each side of the arroyo and about 400 feet apart. Each group consisted of three pits about 10 feet deep with drifts at the bottom from 4 to 8 feet long.

All of the clay contained brown iron-stained streaks, but below the first 2 feet the percentage of iron-stained material is very small. For a depth of 2 feet the clay contains some organic matter besides a considerable percentage of iron, and is very plastic. The firm white clay below varies greatly as regards plasticity. Most of the material exposed in the various holes possesses this valuable quality to a limited extent only, but one pit on the west side of the arroyo furnishes a pure white clay, highly prized by the workmen, which is much more plastic. Sample No. 6, taken from the largest pit on the east side of the arroyo, represents the first class, while No. 7 is a sample of the more plastic clay.

It was impossible for me to determine the extent of this bed of clay, owing partly to the limited time at my disposal and partly to want of exposures or extensive development work, but from surface indications the deposit seems to be large. No stratification was apparent, and below the first 2 feet there was no change in the character of the clay except in the plastic clay in one of the western pits, as noted above. The clay is used to calk bancas and also as a paint or whitewash.

The trail from the mouth of the arroyo to within a short distance of the workings passes over volcanic tuff, which has been worn away in places to a depth of 6 feet. The elevation of the deposit above the level of the lake was estimated to be between 700 and 800 feet.

I was unable to find an exposure of good rock northwest of Los Baños. Volcanic tuff alone was in evidence for a distance of 2 miles inland.

The area in the vicinity of Santa Cruz for about 4 miles on each side is low, flat land, or low hills supporting cocoanut groves.

About half a mile south of the town of Pagsanjan one enters the famous gorge of that name. The vertical walls of this canyon, 300 to 400 feet in height, covered with vines, shrubs, and small trees, with the clear mountain stream between, present a most beautiful and impressive picture. The canyon walls are remarkably parallel and are seldom 100 feet apart.

At the entrance of the canyon occurs a small exposure of what appears to be a solid igneous rock in place, but it shows for only a few feet along the banks. The walls of the canyon proper are composed throughout of a conglomerate of dark-colored igneous rock, bound together with a soft basic cementing material of medium hardness. The bowlders present a variety of forms, but in a general way they are similar, being composed mainly of dark-colored silicates, and all are fine grained. Some are vesicular, while others are very compact. Many of the bowlders in the stream have a smooth black outside coating, probably a deposit of iron compounds. No quartz was detected in any of the rocks, but particles of jasper and small quartz crystals were found in the sands of the stream beds. The conglomerate beds showed distinct lines of stratification and the dip as determined by you is 5° to 6° in the direction north 85° west.

When ascending the river the first waterfalls encountered are the Talon-talagib Falls, which come tumbling down a hanging valley and over the east wall. At this season of the year (February) the stream is small and a considerable portion of the water splashes down over the rock instead of falling clear. The slope of the wall at the falls is about 80°.

As shown by maps, this canyon leads to Cavinte, where the natives say there is a waterfall of the main river.

The Botocan Falls are on the Botocan River, which joins the Pagsanjan on the west at the town of Pagsanjan.

One-quarter of a mile above the town of Pagsanjan, on the west bank of the river, there stands a stone bathhouse, which was built by the Spanish Government and supplied with water from a mineral spring near by. The following description of this spring may be of interest. It is a translation from the "Memoria Descriptiva de los Manantiales Minerales Medicales de la Isla de Luzón," by D. José Centeno, 1890.

WATERS OF BOMBOÑGAN, PAGSANJAN, LAGUNA.

TOPOGRAPHY AND GEOLOGY.

On the left bank of the Bomboñgan River, about 300 meters above its junction with the Balanac, where the town of Pagsanjan is situate, and 5 meters above the water level of the river, a large spring gushes forth, whose waters are used with great faith by the natives of the province of Laguna for many of their ailments.

The spring seems to be in a recent conglomerate of volcanic rock, but it is to be presumed that in the interior it runs over banks of volcanic tuff which constitutes the subsoil of all of this region and which begins to appear on both banks a short distance from the spring and at a lower level.

SPRINGS.

Although only one is ordinarily spoken of, there are various springs in the vicinity of the one which is generally used and is known by the name of Bomboñgan. The waters of this last one are gathered by means of a small canal in a basin of rubble work, inside of a small house which serves as a shelter for the bathers.

The volume of the spring whose waters are collected for the bath, calculated from data taken on the 3d of August, 1885, was found to be 2.31 liters per second, or approximately 200 cubic meters in twenty-four hours, it being possible, if found necessary, to triple this amount of mineral water, collecting from the near-by springs that which is now wasted.

PHYSICO-CHEMICAL CHARACTERISTICS OF THE WATER.

Colorless, odorless, transparent, and has a slight inky taste scarcely perceptible. No reaction with litmus paper. Without bubbling gases. Temperature of water 31.5° C. (air at 30° C.). Variation in temperature hardly perceptible. Density at 0° C. and 760 mm. pressure = 1.003906.

RESULTS OF ANALYSIS.

The anhydrous substances found in one liter of mineral water were:

	Grams.
Carbonic acid, free	0.286240
Oxide of iron in the residue from evaporation	.004140
Oxide of calcium in the residue from evaporation	.034832
Oxide of magnesium in the residue from evaporation	.027529
Oxide of iron in the water boiled and filtered	.017000
Oxide of calcium in the water boiled and filtered	.007280
Oxide of magnesium in the water boiled and filtered	.002928
Silicic acid	.062400
Sulphuric acid	.010301
Chloric acid	.012864
Sodium oxide	.005299
Nitric acid	Trace.
The fixed residue obtained by evaporating directly 1 liter of the mineral water and drying at approximately 180° C. weighed	.380000

DEFINITE ANALYTICAL RESULT, DEDUCED BY CALCULATION.

One liter of water at 31.5° C. contains in solution:

		Grams.
Oxygen	1.754928 cc.	0.002509
Nitrogen	11.783071 cc.	.014800
Carbonic acid	84.750000 cc.	.167358
Iron carbonate		.009200
Calcium carbonate		.089568

	Grams.
Magnesium carbonate	0.086615
Calcium sulphate	.017511
Sodium chloride	.012844
Magnesium chloride	.006855
Ferric oxide	.017000
Silicic acid	.062400
Nitric acid	Slight trace.
Total of mineral substances	0.486660

Classification: Hypothermal waters, mixed bicarbonates, and nitrates.

COMPARISON OF THE RESULTS OF ANALYSIS.

	Grams.	Grams.
Total of mineral substances per liter, according to the above table		0.486660
Volatile substances:		
Oxygen	0.002509	
Nitrogen	0.014800	
Carbonic acid, free	.167358	
Carbonic acid, in form of acid salt, with carbonate of iron	.002530	
Carbonic acid, in form of acid salt, with carbonate calcium	.027368	
Carbonic acid, in form of acid salt, with carbonate of magnesia	.029543	
		.244108
Difference corresponding to the theoretical quantity of fixed substances		.242552
Fixed substances per liter, determined experimentally		.248000
Discrepancy		.005458

PHYSIOLOGICAL EFFECTS.

The commission, not knowing these effects, has not been able to take clinical observations which would serve to form an approximate opinion of the action of these waters. Owing to their limited mineralization and moderate temperature, it is supposed that their curative action may not be very pronounced, but that for this reason they ought to be employed in the treatment of certain diseases as a powerful auxiliary, both in drinking, through the quantity of salts contained, and in bathing through their tepid condition.

Natives who live in the vicinity of the spring do not forget to attach great importance to it, attributing to it numerous and extraordinary cures, which have been without doubt the reason that in a certain noteworthy book these waters appear described in an exaggerated manner, and also with unlikely analyses, which ought not to receive serious consideration.

THERAPEUTICAL INDICATIONS.

Considering only the chemical composition of these waters and their temperature, the following applications may be set forth: Convalescent pains, anæmia, chlorosis, dyspepsia proper, gastro-intestinal catarrh, pelagra. Uses: Bathing and drinking. Bathing season: November to June.

After crossing the Botocan River at Pagsanjan, the trail to Cavinte follows along the west side of the Boo River until within 200 yards of Cavinte, where it crosses the river by means of a large stone bridge.

The trail is on beds either of conglomerate or volcanic tuff all of the way. At Cavinte the red clay appears, and, together with the gray volcanic tuff, constitutes the surface covering to Botocan Falls. Exposures of this red clay over 12 feet in thickness were observed.

The territory below Cavinte is characterized by sharp, steep ridges and narrow valleys, which decrease in size and steepness between Cavinte and Luisiana, and beyond Luisiana the topography is that of a gently rolling country with well-rounded hills. From Luisiana to Botocan Falls the trail runs along, on, or near the top of the ridge until it strikes the Botocan River, some 200 feet above the falls, where both a plank and a bamboo footbridge have been thrown across the stream.

The falls, whose energy it is proposed to transmit to Manila in the form of electric power, are nearly 200 feet in height. Before going over the cliff the stream divides into three parts, the two on the outside shooting straight over an abrupt shelf, while the middle one tumbles down the cliff for 15 feet before it clears the rock wall.

The upper 25 feet of the rock at the falls has the appearance of volcanic tuff, except that it exhibits a well-developed columnar structure, with pentagonal cross sections predominating, and shows flow lines which are absent in a typical tuff. Underlying this bed rock there is about 70 feet of a light-colored rock, probably a conglomerate, although no close examination could be made; then comes 110 feet of black conglomorate, probably the same as that forming the Pagsanjan cliffs.

The river makes a sharp turn at the falls, the direction of the stream above being north 68° east and below north 31° west. The east wall at this turn is semicircular in shape and 300 feet high. The upper 120 feet are tuff and show the columnar structure very well.

Samples Nos. 18 and 19 are from the river bank immediately above the falls, where the rock shows at least two horizontal planes, which may be the parting planes between different flows or eruptions. Although this material resembles ash more than lava, it must have had sufficient fluidity to flow to some extent at least, and on cooling assumed a columnar structure so common in basalt.

It may seem strange that with a comparatively soft tuff overlying a conglomerate composed mainly of hard igneous rocks a stream should be able to form a perpendicular cliff such as this; but this is made possible by the weak, nonsiliceous binding material of the conglomerate. This cementing material closely resembles volcanic ash, and no doubt the history of the conglomerate is interwoven with the history of the volcanoes of this region.

The elevation of Botocan Falls as given by the bureau of engineering is 1,080 feet. The highest point on the road between Luisiana and the falls is some 150 feet higher.

Between Botocan Falls and Majayjay the trail, running at right angles to the numerous small streams, alternately ascends and descends a series of steep hills. A large portion of this road was at one time paved with water-worn bowlders, and in places the pavement is still intact. The stream beds are in tuff, the banks being usually vertical and 8 or 10 feet high.

From Mayjayjay, which has an elevation of 1,000 feet, the land slopes gradually to the lake, as though it were the gentle slope of on old volcano. Volcanic tuff is the only rock visible below Majayjay.

The town ot Lumbang on the east bank of the Pagsanjan River is easily reached by banca from Santa Cruz. During the wet season a banca can pass over the low west bank of the river at this place, but during the dry season the banquero must either go down about three miles to the mouth the river and then come up against the current, or have the banca hauled over the 150 yards of intervening mud by a carabao.

Flat cocoanut and rice lands occupy the east side of the river for half a mile back of Lumbang, then the hills, 400 to 500 feet high, rise abruptly, leaving an opening for a small stream and deep canyon. I had time to ascend this canyon but a short distance, and so far as I went found nothing but a black conglomerate, the same as shown at Pagsanjan gorge. A stream bed contains an immense quantity of igneous rock of different kinds, and the walls are high, but without vertical cliffs.

At Paete a short canyon runs back from the lake and terminates less than a mile east of the town in a cliff and waterfall 130 feet high. The cliff is composed of a fine-grained melaphyre (f. n.) which breaks into very sharp irregular shapes. Sample No. 20 is a specimen of this rock taken from the foot of the cliff. Higher up the stone is somewhat more compact. Below this occurs about 50 feet of more vesicular rock although otherwise much the same.

The stream bed immediately below the falls is filled with bowlders of this same close-grained rock, but about 30 feet lower the channel is blocked with large bowlders of a felspar-porphyry (f. n.) of a striking appearance. Some of these large cubes are 8 feet on a side and must have fallen from above, although about 50 feet lower down they form the bed rock of the stream for at least 300 feet and must have a thickness of 50 feet or more. This rock, of which sample No. 9 is a specimen, consists of felspar phenocrysts up to one-half inch in length embedded in a fine slate-colored ground mass. The stone has a handsome appearance but is wanting in strength and toughness, or, in other words, it is friable.

Mr. Roces, of Paete, has imported from the United States a complete equipment for a modern saw and planing mill and is now setting up the machinery. He intends to use the power of the falls to generate electricity with which to operate his machinery, although he also has a boiler and engine for this purpose. According to measurements of the flow of the stream made by Mr. Roces the falls will generate 100 horsepower in the dry season, which will be just about enough to operate the mill.

The abrupt rise of the land one-half to three-quarters of a mile from the shore from almost water level to 400 feet or more begins at Pagsanjan and continues around past Limbuan, Paete, and Paquil to Pangil, where it is terminated by the valley of the Salamboloc River. The land between Pangil and the Salamboloc River proper at Siniloan is perfectly flat and planted with rice.

On the west side of the Salamboloc the ridge of volcanic rock runs down to a point about a quarter of a mile southwest of Siniloan. Although numerous bowlders occur on the ridge, no exposure of the rock in place could be found.

A good road runs along the foot of the hills from Paete through Paquil and Pangil to Siniloan, which was traversed on foot, but no rock exposures of value were found.

The map shows Siniloan to be nearly due north of Pangil, but I found the magnetic bearings taken with a Brunton pocket transit to be north 45° west. Matiquio is also shown much nearer to Mavítac than it should be. The bearing from Matiquio to Santa Cruz I found to be south 15° east instead of almost due south, as shown on the map.

The low hills a mile northwest of Matiquio are covered with bowlders of melaphyre (f. n.), but the only exposure of rock in place showed volcanic tuff (sample No. 10B). In Matiquio I obtained a small sample of white kaolin clay (sample No. 11), which is reported to occur about 2 miles north of the barrio and a mile from the lake shore. It resembles the Los Baños clay in appearance and is used for the same purpose. This deposit has been recently located by some of the officials of Laguna Province, and I have since received good samples of this clay from Mr. Sherfey, supervisor of the province, who owns an interest in the claim. It is reported that this clay can be gotten to market more easily than the Los Baños product.

There is a foot trail from Matiquio to Jalajala which I desired to pass over in order to obtain a better idea of the structure of the main ridge on Jalajala Peninsula, but it was found necessary to return to Santa Cruz.

The shore from Bagombong around the point to Jalajala shows no solid rock, as the land for some distance in from the shore is low and flat. Jalajala Peninsula near the town of Jalajala seems to be composed of one material, a light-colored volcanic tuff, sometimes stained with iron oxide, but more often nearly white.

On the southwest side of Mount Sunung-Dalaga, about 2 miles northeast of Jalajala, a landslide exposes this tuff for nearly 100 feet vertically. Although in small pieces it closely resembles hardened clay, it has no plasticity, shows no stratification, and vesicular fragments, so characteristic of volcanic tuff in other parts of this region, seem to establish it a tuff.

The shore for one-fourth of a mile along Bulabula Point between Quisao and Pardia is strewn with melaphyre (f. n.) bowlders, but the rock in place is not exposed. The point is covered with small trees and is 25 feet high at the water's edge; 200 yards inland it is probably 100 feet above the level of the lake.

In a small bay just south of Quisao there are two brick kilns and a large dwelling house belonging to Mr. Collins, an American, who has resided for many years in this vicinity. Ladrones have robbed the place many times and it is not occupied at present. My banqueros said that pieces of limestone found near the kilns came from the direction of Manila, but that it was also found in the hills to the east.

Blocks of volcanic tuff are being cut from a small ridge that extends to the water's edge a mile south of Tanay. It contains many lumps of hard compact rock imbedded in the soft material.

At the beginning of the hills, three-quarters of a mile north of Tanay, there are exposures of a dark-colored conglomerate which composes the surface covering for at least 1½ miles inland.

Only volcanic tuff shows near the shore from Morong until almost opposite the north end of Talim Island, when the basalt (f. n.), of which the north end of Talim is largely composed, is found on the mainland.

An inspection of the south end of Talim Island failed to reveal a good building stone. The most southern part consists of the same basalt (f. n.) that the city of Manila quarries and crushes on the north end of the island.

The natives are industriously at work pounding up the rock by hand into concrete size.

From a point opposite Malahi Island to Point Naglunglung, on the east side of Talim, the rock exposed along the lake shore is vesicular melaphyre (f. n.), of which sample Nos. 16 and 12 are specimens, although No. 12 is not representative of the rock. At Naglunglung point there is a compact leucophyre (f. n.) that shows for 100 feet along the shore and can be traced about 200 feet inland before it becomes covered with soil. It is firm and tough, but appears to have no jointing planes and to be of small extent.

The lake shore from Talim to Binangonan has several cliffs of volcanic tuff, but no crystalline rock was observed. On the point just north of Binangonan, in the vicinity

of the abandoned quarry of the city of Manila, about 30 men are at work cutting out stone blocks. The large ones, some of them 3 feet by 18 inches by 18 inches, are sold for tombstones, while the smaller ones, squared up and faced on one side, are used to pave alleys and for sidewalks. A stone 10 inches by 10 inches by 3 inches sells for ₱0.10 in Manila, while one 18 inches by 18 inches by 4½ inches brings ₱0.80. The rock is a vesicular basalt and consequently is a very poor stone both with respect to appearance and durability. Sample No. 13 is a representative specimen, while Nos. 14 and 15 show beautiful calcite crystals in cavities in the rock. The rock parts readily along a horizontal plane when the rock is in place and this parting is parallel to the flow lines of the rock.

A cross-sectional view of the ridge given by the face of the old quarry shows 15 to 18 feet of this vesicular basalt (f. n.) overlying the dark compact rock which appears to be identically the same as the rock at the plant at Talim. The lower north side of the ridge is tuff.

The small workings of the stonecutters run 150 yards east of the old quarry. They work in horizontally almost at the top of the ridge, in no place having exposed a face more than 10 feet high.

About 3½ miles north of Binangonan on the trail to Antipolo is a bed of crystalline limestone which is transported on carabao sleds to several small barrios along the lake shore west of Binangonan and burned for lime. This bed of limestone is not over 200 feet wide and strikes due south. Its southern exposure lies due west of the mouth of the river at Morong. It is the first high ground on the west side of the valley, forming a secondary ridge parallel to a slightly higher ridge of igneous rock some 200 yards farther west.

From the topography of the region it would seem that a road could be built to the lake at Morong without great expense.

No stratification planes are apparent, but there are great cleavage planes roughly dividing the stone, which dips west 70 degrees from the horizontal. The rock weathers into rough vertical columnar shapes which show no minor plates of parting. It is uniform in composition, strong and compact, but as it does not break into regular shapes it will be difficult to cut into dimensional stone. In samples Nos. 17A and 17B you discovered fossil remains believed to be nummulites, which have been reported to be present in this rock by Baron von Richthojen.

CONCLUSION.

While this investigation does not prove conclusively that there is not a good building stone near the Laguna de Bay, it shows that the existence of such a stone is improbable.

The country near the lake shore from the Pasig River almost to Los Baños is low and flat land, so that no investigation of this area was necessary.

Diligent inquiry brought to light but one reported occurrence of a building stone. Mr. Sherfey, supervisor of Laguna, reported on the authority of one of his road foremen that in Spanish days a hard dark-colored rock had been quarried on the Calamba side of Mount Maquiling. He has recently investigated and found that the stone was gotten from large bowlders of feldspar melaphyre (f. n.) in a small arroyo about a mile from the lake. From a sample of the rock (No. 20) it will be seen that it is not a first-class building stone.

The natives of Laguna Province especially seem to be well content and prosperous.

I was everywhere received very kindly by both Americans and Filipinos, and am especially indebted to Mr. Sherfey, of Santa Cruz, for his assistance in many ways.

Respectfully submitted.

H. M. Ickis, E. M.,
Field Assistant, Mining Bureau.

Mr. H. D. McCaskey,
Chief of the Mining Bureau, Manila.

APPENDIX J.

REPORT OF THE BUREAU OF GOVERNMENT LABORATORIES.

DEPARTMENT OF THE INTERIOR,
BUREAU OF GOVERNMENT LABORATORIES,
Manila, September 15, 1905.

SIR: The bureau of government laboratories has been established in its present buildings since September, 1904, and power was used for the first time at the formal opening of the laboratories on February 28. Therefore the machinery has been in operation approximately for six months, and it is possible very nearly to calculate the cost of operating the plant and to determine whether an economy has been effected by installing the machinery. The result of comparative tests, both with an even and with a varying load, shows that the power we have used on an average have cost about 10 centavos per kilowatt hour, the outlay for the engine-room force and for wear of the engines not being included therein. It would be difficult to estimate what increased charges should be added for the latter purpose, because, were the bureau to use any other source of power, it would need machinery to do its work, and such machinery would be subject to wear and tear, and would require an engine room force, as well as the present plant. However, it would seem a safe estimate to say that any other source of power would need to be furnished at less than 15 centavos per kilowatt hour if it were to compete with the present machinery. The cost of the building and its accessories has been as follows:

	U. S. currency.
Main building and power house	$121,099.55
Mechanical equipment, laboratory desks, hoods, fixtures, etc	68,475.06
Stables and small animal houses	11,022.08
Grading and filling	912.30
Total	201,508.99

When we consider that for this sum the government has obtained a large building, with boilers, engines, dynamos, piping, laboratory desks, hoods, fixtures, vaccine, and horse stables, it is evident that, considering the expense of materials in this country, we have a plant the cost of which will compare most favorably with that of any similar one in other countries. When we recall the many branches of scientific work taken care of by this one institution, and compare the cost of the buildings with that even of the simpler university laboratories, which are generally devoted to one subject only, it will be evident that the government of the Philippine Islands has by no means been extravagant in its outlay for scientific work. The cost of the permanent apparatus and the library was approximately as follows:

	U. S. currency.
Library	$36,000
Apparatus	26,000
Total	62,000

This gives a grand total of $263,508.99. The request for appropriation for all expenses of the bureau of government laboratories for the fiscal year 1906 is $154,943.06, United States currency, which is 1.7 per cent of the total appropriation for all departments of the insular government for the fiscal year 1905. When we consider the results which can be obtained by a thoroughly equipped laboratory, and the many ways in which this institution already has aided the government, this charge is certainly a moderate one. Valuable information in many fields has been acquired, given and published, the public health has been conserved by means of accurate diagnoses of disease, and the serums and prophylactics in daily use have been prepared. The educational value of a scientific bureau and the possession and use of a scientific library can not be underestimated.

From the beginning it has been the intention of the government to have the laboratories organized so as to take their part in the economic development of the islands, but while there can be no question even in the lay mind unaccustomed to scientific problems of the utility in an economic way of the biological, chemical, and serum laboratories, there have from time to time been doubts expressed as to the legitimate functions of botanical and entomological work. To make clear the relationship of the botanist to this field of work it must be remembered that all botanical investigations at the present time are primarily dependent on systematic botany, and that this branch of the science can not study its material without having at its disposal properly prepared and preserved botanical specimens, collected and filed in an herbarium. The latter should be so arranged as to be readily accessible, and the material collected should, where possible, have reference to the relative abundance or scarcity of the individual species, their distribution and native names and uses. The herbarium thus becomes a card catalogue of the economic and scientific aspects of Philippine botany. With such material at hand it is possible to identify all plants of economic value and to determine their occurrence in countries other than the Philippines, where at present they may have uses unknown to us. Frequent requests for identifications and for statements as to the value of plants are received from the American and European residents of Manila and of the provinces, and much information has been furnished as to the occurrence and abundance of plants which may be economically useful. The information so asked can often be supplied from the data compiled in the herbarium, and the necessity of importing seeds or living plants can thus be avoided. To determine the identity of a Philippine plant with the same individual of a surrounding country, it is essential to ascertain the correct scientific name of the species, because the native name is of no value in this respect. To cite an instance, it became possible for this bureau to show that Philippine narra is identical with Indian padouk, a timber which has long been favorably known in the European markets and where it commands a high price, and it is evident that we can ship narra under its Indian name and thus command a market where otherwise delay would result and importers would need to be convinced of the uses of our wood.

The forest trees of the Philippines are now known to exceed 1,500 distinct kinds. The manner of their growth in marked forest areas, the conditions essential to the best development of the trees, and the means to be adopted to further forest interests are largely dependent upon botanical work. In agriculture, the identification of economic species of wild and cultivated food and fiber plants, of fruits, and so forth, have been of great value, and the correlation of the data so obtained with similar facts developed in regard to other countries has given us knowledge which can be made the basis of economic results. A study of the parasitic fungi which attack and destroy rice and other crops, fruit, cacao, and similar trees, is of course one of great importance. This involves not only the identification of the host but also that of the parasite, so that we may apply methods which have been used by other investigators in combating the same or similar diseases in other countries.

The teaching of botany has been undertaken by the bureau of education, both in the normal school and the provincial high schools, and to render this work feasible and more than perfunctory extensive herbaria for distribution to the provincial high schools have been prepared. In the economic work of the bureau of government laboratories, the identification of plants producing oils, resins, rubber, gutta-percha, alkaloids, and so forth, has been an essential preliminary to the prosecution of investigations on economic products.

The entomologist has been consulted by private and commercial tobacco growers and manufacturers, by cocoanut farmers, rice, cacao, and coffee growers, by chocolate manufacturers, the street railways, the bureau of forestry on the method of preventing insects from destroying timber, by the bureau of agriculture in regard to the insects attacking rice, garden vegetables, corn, cotton, cocoanuts, jute, and cacao, by the Army and Navy in reference to the pathological importance of flies, because of their possible pathogenic and pathoforic forms, and by the laboratories for identifications of insects connected with various diseases. The relation of ticks to Texas fever, of flies to surra, and other similar problems all come before the entomologist for consideration.

In order to establish identifications, and to compare the results with those obtained in other countries, it is as necessary to have an entomological collection as it is a botanical herbarium. In addition, the entomologists have been able to attack economic problems, such as the production of silk in the Philippine Islands, the best method of rearing the worms, and the means to be adopted for producing a breed which may possibly be resistant to Philippine conditions and which will be able to live on ordinary Philippine leaves.

In considering the outlay necessary for the bureau, it should be taken into consideration that its equipment is to a large extent purchased, and that this outlay involved the investment of a certain amount of capital. The running expenses of the bureau would approximately be as great as they are now, even though the corps of workers were to be reduced; whereas it is evident that additions to the present corps will cost the government but little beyond the salaries of the individuals so added, while the good which can be accomplished is disproportionately great. It is very unfortunate that the laboratory force is at present not

sufficiently large to enable the bureau to keep men continuously on one specific problem when once its study has been begun. The present conditions render it imperatively necessary to take men from investigations on which they are engaged and to transfer them to the routine work brought to the bureau from other divisions of the government. The expectation of complete results on any one economic line will be much increased if the laboratories were allowed even a very few men who could devote their time continuously to problems of this nature, because interruption not only means actual time lost by taking the worker away from his investigations, but it also means loss of time by the taking down and setting up of apparatus, by the decomposition of products which should be worked up immediately, by the change of interest of the worker to a new field, and by the difficulty of again readjusting himself to the subject at exactly the point where it was left. Consequently it is evident that the loss of time is not merely the loss in hours during which the employee's energies are engaged in other directions, but there is also a not measurable delay, due to the above causes. Therefore, it is advisedly said that one employee giving his time continuously to one economic problem can accomplish more than three could by giving equal amounts of partial time. It is to be hoped that at a not too distant date the government will feel itself in a position, to a certain extent, to increase the number of workers in the bureau.

During the superintendent's recent visit to the United States he discovered that the increase in the manufacturing interests, not only in chemical but in biological lines, has been so great that positions in the various manufacturing houses were now available at good salaries even to undergraduates. With this fact before us it is evident that if we wish to procure thoroughly trained men the scale of salaries in this bureau must ultimately be increased. A poorly trained man or one not capable of accurate results is worse than useless, for his reports may cause incalculable damage. It is literally true in an institution such as the bureau of government laboratories that the salary of a cheap man is eventually the dearest outlay which could be made.

During the past year, between the months of October, 1904, and June, 1905, the superintendent of government laboratories was in the United States on leave. Dr. R. P. Strong was acting superintendent during this period, and it was while he was so acting that the final work in completing the building was done. The last details therefore fell upon Doctor Strong in seeing that the plans were completely carried out, and the thanks of the superintendent are due to him for the painstaking and conscientious manner in which he met the responsibilities imposed upon him.

The superintendent of government laboratories while in the United States visited a number of educational institutions. The University of California, Leland Stanford University, the University of Wisconsin, the University of Chicago, and Columbia University are included in this list, and in each place he endeavored to ascertain what well-trained young men were available for Philippine service. One difficulty he encountered at the outset, namely, in the great reluctance of scientific men who had family connections to come to the Philippine Islands at the salaries which we could offer, but during the visit a number of young men were discovered who might be secured. All of these are properly trained, possess degrees from well-known institutions of learning, and to judge from personal observation are well fitted for our work. It would seem advisable, where universities can furnish us with the names of candidates for our positions, and where these candidates have the backing and guaranty of qualified teachers who are masters in their respective lines of work, to omit a competitive examination such as is generally required by the civil service board. It is well to consider the arguments on the other side, namely, that by announcing competitive examinations the civil service board is able to secure candidates from a wider range of territory and is able to give every one in the United States who cares to compete an opportunity of so doing and also to subject all to a rigid scrutiny, unbiased by the recommendations given by teachers to pupils. However, in practice the result is not as satisfactory as might be expected from the premises. An examination can frequently be passed very satisfactorily by a man who is but ill equipped to take part in the practical, everyday work of a laboratory, and such examination gives no indication whatsoever of the ability of the candidate in respect to original work. It has been the writer's experience during his university career that not infrequently students who during the course of the college year had shown themselves deficient in many respects were by reason of concentrated study in the last few weeks able to outclass many of their companions in the examinations, when in reality these companions were far superior in the quality of their work and the results which they were able to obtain. The same must necessarily be true in examining candidates by civil-service methods for scientific positions in these laboratories. On the other hand, where the men can personally be interviewed, and more especially where their teachers can be met, the bureau can obtain a much greater certainty as to their availability for the class of work to be undertaken. Perfunctory examinations might lead us to expect candidates highly proficient in the technique of their respective lines of work, whereas actual demonstration might prove their knowledge to be largely theoretical and acquired from text-books; besides which workers in the laboratory must be familiar with the literature of their subjects

and able to use the journals intelligently and with definite ends in view. The argument might be advanced that were the system of competitive examinations not followed the candidate from the smaller college would not be considered. However, it must be borne in mind that thoroughly trained scientific men of to-day, if they have taken their preliminary undergraduate course in one of our smaller colleges, must certainly have fitted themselves for their positions in one of the universities. It is evident that many of our smaller institutions can not have at hand facilities, apparatus, and literature with which thoroughly to train their advanced students. Indeed, one of the troubles with this class of student is that he can not realize his shortcomings, never having come in contact with broader standards to compare himself with. Another difficulty which presents itself in selecting candidates by competitive examination is found in the fact that many of the best men who are in a position to obtain situations in our universities or in our large manufacturing establishments which control scientific laboratories do not care to take their time or to place themselves in competition in the manner prescribed by the present *modus operandi*. As a result, and I believe experience bears this out, the competitive scientific examinations very often altogether miss the best material. It is believed that the proper means of filling laboratory positions is to be found in a personal investigation of the merits of the various candidates by members of the laboratory staff or, where this is not possible, by the recommendation of professional men of the highest standing at home. This opinion is written with the full knowledge that some very good men on our present staff have been secured by the former method. The list of men available can not be maintained indefinitely. A year after a member of the laboratory force has visited universities in America most of the scientific workers whom he will have encountered will have obtained permanent and lucrative positions at home, so that the list of available names is a constantly changing one. The same criticism holds good of the competitive examinations, where a few months after such an examination is held it is frequently found that the best men who have taken it are no longer willing to come. This condition must inevitably be true where a limited number of vacancies exist and where it is generally impossible to predict at what time a position will be open. It frequently happens that a member of the staff leaves for America without allowing the bureau the time for finding his successor by competitive examination, because this method necessarily takes a number of weeks after the notice of the vacancy has reached America. For this reason it would seem advisable, in filling laboratory positions, to adopt the policy of placing on the list of available candidates such men as have been discovered by competent members of the laboratory force while on leave in the United States, and in addition to select, from recommendations of the best authorities at home, candidates who know of our work, who are interested in it, and who will be available in a much shorter time than the ones selected by any other method. It would be easy to name men of high standing in all branches of science who would gladly and conscientiously further our interests in this respect and, if they knew that the civil service board would apply to them, they would be careful to bear in mind the necessities of our service and to train students for it, and instructors would notify us of available men. It is believed that by this means we would always have a satisfactory number of candidates and, in addition, would avoid useless delays. The latter question is one of great importance, because when a vacancy under the present system occurs it is not infrequently a question of months before it can be filled, and as a consequence the strain upon the laboratory force and continued change of work on the part of its individual members is always serious during these intervals.

Besides interviewing the presidents and members of the faculties of the universities mentioned above, the superintendent made some inquiries as to the feasibility of securing donations for the laboratories for specific equipment and for fellowships. Primarily this institution labors under the difficulty encountered by all state organizations in the unwillingness of persons of means to give funds where, in their opinion, the support should devolve upon the state, and although great interest is manifested in our work, yet actual gifts have been few. However, encouragement was held out in regard to a donation to establish a marine biological laboratory, and the necessary data showing the expense of such a division have in large part been collected. The plan proposed would include a laboratory in Manila, with an exhibition room for the general public and private rooms for the workers, a scow or flat boat for migratory service, equipped with a dwelling cabin, laboratory, pumps, and aquaria, a steam launch to move this laboratory from place to place, and the usual equipment of scientific apparatus. A considerable proportion of the expense would, of course, fall upon the library. Much of the literature on the subject of marine biology is to be found in journals devoted to the purpose and which would need to be purchased outright. However, a certain quantity of this, especially that part concerning fish and fisheries, is to be found in Government publications, and steps have already been taken to secure such literature free of cost or by exchange with the publications of this bureau.

The plan of work for a marine biological laboratory would consist in gathering materials by means of the migratory station, in mapping out areas, and in studying the habits of the marine fauna of the islands, and in sending to Manila such portions of the work as would

need to be developed in a permanent station. The investigation of the fish and fisheries from an economic standpoint is, because of our situation, the most important phase of the matter. By the help of a suitable laboratory an examination of the fisheries could be made and a study of the habits and food of the fishes undertaken, and when this is at least in part completed measures for the protection of the various species could be inaugurated. Search for new fishing grounds, particularly for trawling areas, would also fall within the scope of the work, and in this way territory at present unavailable would be made economically useful. At present fishing in the Philippine Islands is of a desultory character, being carried on by the natives and by Japanese in small boats and over limited areas, yet in many of the regions where such fishing is practicable the food fishes are rapidly becoming depleted. Trawlers would be particularly useful in developing the occurrence of flat fish, such as soles, plaice, turbot, brill, and others which dwell upon smooth and sandy bottoms and which can only be captured by modern methods. It would also be in the interests of the islands to determine the best means of protecting, rearing, and regulating the capture of the green and tortoise-shell turtle, to encourage culture of pearl oysters, lobsters, crabs, and shrimps. It is also true that sponges apparently of a high quality have at times in a desultory way been observed in the Philippine Islands, and it would seem probable that large areas exist which it would be profitable to develop. A marine biological laboratory would also desire to work on the purely scientific phases of the question, which, of necessity, go hand in hand with the commercial ones.

The estimate of the cost of this undertaking has not entirely been completed because several features of the construction of the aquaria and of the laboratory are still under discussion. It might be assumed that the cost of the Manila central aquarium would be about $30,000 United States currency, that of the portable scow $4,000, of the launch $8,000, and of the apparatus and equipment, including laboratory tables, rowboats, trawls, seines, dredges, microscopes, glassware, etc., about $4,500. In addition to this equipment, maintenance, repairs, and employees would cost about $20,000 a year more. This expenditure would place the undertaking on a secure footing, and would undoubtedly bring the best of results, both in a commercial and in a scientific way. The superintendent of Government laboratories will forward all the estimates in regard to this matter to the United States as soon as the accurate data are completed, and it is hoped a sufficient interest will be aroused to bring the matter to a successful issue. Much of the information which has been gathered has been with the assistance of Professors Reighard and Duerden, of Ann Arbor, Mich., whom I wish to take this opportunity of thanking for the great interest they have displayed.

The superintendent, in addition to the obtaining of data on the marine biological laboratory, also discussed the subject of scholarships or fellowships during his visit to the United States. While none were definitely promised, the conditions are at least such as to warrant the statement that there is but little doubt but that within a year a fellowship in biological work will be established in the bureau of government laboratories.

Another phase of laboratory work was brought to the attention of persons interested in Philippine resources, namely, the question of the establishment of field parties to investigate the medicinal plants of the islands and to bring into the laboratories supplies necessary for chemical work on this subject. There is unquestionably a large amount of material for profitable research of this kind, but the laboratories have been unable to do anything in this direction owing to lack of employees; work on the medicinal plants not only involves exploratory operations in the field, but also investigations in the central institution. It was impossible to do both these things at once, because when a man was spared from the laboratories for exploration in the provinces, the necessary work of the bureau was neglected. This question was brought before some of our leading manufacturing chemists and the possibility of some concerted action discussed. Whether it will bring results in the future can not be stated. Certainly no one is more interested in this question than our manufacturing chemists, who are constantly securing new products or improving the quality of the old. Were they able by means of such explorations to enlarge their pharmacopœia or to obtain from reliable sources substances now commonly used the results would certainly be to their great advantage.

Throughout the United States, in scientific circles and in the various universities, the greatest interest in the laboratory work was manifested and many flattering comments were received. The educational value of the institution was especially dwelt upon, and many expressed the belief that the advancement of the Philippine people could best be undertaken by means of scientific work carried on by the best investigators obtainable and by means of the best equipment possible. In Europe, especially in Germany, the superintendent found all university men with whom he came in contact conversant with the work and willing to assist in every way. Some of the leading professors of the University of Berlin were especially interested in the plan of the bureau to provide space and laboratory facilities for scientific guests, and a number expressed the intention of availing themselves of the hospitality of the bureau within the next year or eighteen months.

We are now on a satisfactory basis as regards the exchange of materials; botanical, ornithological, and entomological specimens are identified by investigators both at home and in Europe, and our publications are freely exchanged. In this way a knowledge of the work of the bureau is spreading, and our men to a certain extent keep in touch with outside scientific investigators. However, this is not all which is needed. Not only should we be able to exchange the inanimate objects of the laboratory or the written results; we should also be able to do the same with the laboratory force, so that suitable persons in America would for a time visit Manila to take the place of our own men engaged in studies similar to their own. This exchange might be for a year at a time or more properly for eighteen months. Our laboratory workers would be benefited by renewed contact with the scientific world, and the interests of the institution would be advanced by having each year within its walls men who had recently come from the scientific centers of the world. Unquestionably this would exert the greatest influence in maintaining the laboratories in a condition of constant rejuvenation. It can not be denied that scientific workers are isolated in Manila, that the contact with other men in their own lines so necessary for the most successful results and for the exchange of ideas is denied them, and unless the bureau is gradually to become stagnant it must have this infusion of new ideas and experiences. It is strongly recommended that some exchange arrangement be authorized by the commission. The superintendent of government laboratories has already discussed the matter with prominent university men at home, and in each instance met with their hearty approval. The greatest difficulty to present itself would be that it would not always be possible to exchange men of exactly the same qualifications and of relatively the same salaries.

The question of establishing a medical school in the Philippine Islands has been under discussion ever since the formation of the board of health. It has always been recognized that medical instruction which would include laboratory work and which would be open to Filipinos with the proper preliminary training is an essential for the carrying on of efficient hygienic work in the islands. However, the time of the founding of such a school has always been postponed because facilities for placing it upon a dignified and permanent basis were not available. This is no longer the case. With the equipment of the bureau of government laboratories and the class rooms and supplies of the bureau of education the beginning of medical instruction with small classes need no longer be delayed. During the absence of the superintendent of government laboratories the feasibility of some definite recommendation to the commission was discussed by Doctors McDill, Heiser, Strong, Musgrave, and Newberne, as well as by a number of others, and as a result a committee empowered to propose a feasible plan for beginning the work was appointed to confer with Commissioners Worcester and Tavera. Definite action was delayed until the return of the superintendent of government laboratories and then Doctor Barrows of the bureau of education was also called into consultation, and a concrete proposal was made. Doctor Barrows has established a preliminary course leading to medical instruction in the bureau of education, the curriculum of which seems to be admirably adapted to fitting students for the first years of medical instruction. The number of men who will be prepared to go on with the work at the beginning will be limited, perhaps not more than five or six will be fitted during this year, so that work in chemistry, histology, bacteriology, and physiology can be conducted in the laboratories of the normal school and of this bureau, whereas the anatomical laboratory instruction can be given in the San Lázaro morgue belonging to the board of health. The latter place is not by any means ideal, both from the standpoint of location and facilities; nevertheless, it will for the present serve the purpose until a building near to the laboratories and equipped with refrigerating space can be built.

The greater part of the equipment in the form of microscopes, glassware, and other appliances is on hand and but little, excepting instruments for the courses in physiology and pharmacology need be purchased. The commissioner of public health and employees of his bureau, the force of the bureau of government laboratories, the teachers of science in the bureau of education, and certain among the practicing physicians in Manila can very well handle the courses of instruction for two or three years. Ultimately the school will need a building for its purposes. Modern instruction in medicine for the greater part consists in laboratory work, the former custom of teaching by means of didactic lectures having been abandoned, so that in its structural features this building would mainly be devoted to laboratory purposes. As a union of interests is always economical, the structure should be placed in proximity to the present laboratories. The government hospital,when it is established, and the various private institutions will furnish the necessary clinical amphitheaters.

The establishment of such a school by the government and not by private individuals will from the start insure it freedom from the necessity of support by fees, a necessity which is so often detrimental to private educational institutions. It can and must maintain a high standard. Its very existence will, it is hoped, bring to the islands a number of physicians, eminent in the various specialties, who would take places on the faculty and on the hospital staff. To insure a high standing it would seem evident that not only the educational control but also the nomination to the controlling board, for membership on the

faculty, should be in the hands of the members of the latter body, and great care in filling the various chairs should be exercised. Young men with growing reputations, or those who have yet to secure a place in the literature of the scientific world, can well afford to begin their connection with the institution as clinical associates or assistant professors, having the hope of full professorships held before them as the reward for work well done and for published research of a standard character. Because the school would in the beginning be small and because its present teaching force would need to be filled by men on the ground, who know each other intimately and are aware of each others shortcomings, should be no reason why the positions on the faculty should be underrated or why we should not place the standard so high that no one should feel himself entitled to a full professorship who could not with reason believe that he would be recognized for a corresponding position in our best schools at home.

In the original plans of the bureau of government laboratories space was provided for the class of work then coming under the jurisdiction of the institution. This building was so calculated that each of the individual rooms could take up a further number of workers on similar subjects, so that expansion in the lines originally proposed was possible for at least fifteen years to come. After the structure was well under way additions to the staff in the form of the botanists and the ornithologists and their collections were very wisely made, as their work properly belonged to the bureau. This class of work now occupies four rooms of the building, leaving only two laboratory rooms for scientific guests. The herbarium is a bulky collection and is constantly increasing. It is evident that the time must come when these collections will exceed any space which can be given to them, unless it be in a museum or in some structure with large rooms especially devoted to such purposes. It is for this reason that attention is called to the fact that in the original plans of the structure there were contemplated two wings to accommodate the bureaus of mines, ethnology, public lands, agriculture, forestry, the botanical herbarium, and the collections which have been added to the bureau of government laboratories by transfers from the others. It doubtless is true at the present time that the bureaus of forestry and agriculture, owing to the increased space obtained by the purchase of the old Oriente Hotel, now have ample room, so that possibly two wings no longer are necessary, unless it is deemed desirable to place a commercial and general museum in one of them. However, a smaller wing at much less cost, having the general architectural features of the original plan and designed to accommodate the bureaus of mines and ethnology and the working botanical, mineral, ornithological, and pathological collections, is urged upon the honorable the Civil Commission for serious consideration.

During the past year the union of all the scientific libraries of the government in the bureau of government laboratories has been accomplished. By transfer from the various bureaus the library has obtained 6,799 volumes, and although this consolidation involves a net saving to the government, the charge upon the appropriations for this bureau for subscriptions and the current scientific journals has been largely increased, so that it now annually amounts to $1,750 U. S. currency. According to the original understanding with the Commission, the library of the bureau was to receive a sum of $45,290.66 in quarterly, semiannual, or annual installments. One of these, amounting to $7,715.11, is still due to the bureau, and owing to the union of all scientific libraries this fund will need to be expended differently than it has been in the past, because it now must cover all branches of science, so that the laboratories will actually receive less than was originally intended. However, a certain proportion of the funds allowed to the library on each appropriation bill have not been expended for two reasons—one because the superintendent of government laboratories wished to leave a margin of safety between the estimated and the actual cost of books, and the other because a number of sets which it was desired to purchase could not be obtained of the dealers. These funds, having lapsed, are no longer available for the purchase of books, but, after the present final installment to be appropriated for the laboratories has been expended, and when accurate data are available, showing what books on the list sent to dealers can not be obtained, the librarian will draw a balance sheet showing what proportion of the moneys originally authorized have not been paid out, and the Commission will then be asked to reappropriate this sum for the uses of the library. It is evident that, with the increased requirements brought about by the consolidation, further funds will be necessary in the future, but by the method proposed it seems evident that in all probability the needs for a year or a year and a half to come can be covered. During the past year there have been published by the bureau and mailed by the library 20,425 bulletins. An effort has been made to exchange our publications for those of foreign publishers, societies, or associations, so as to diminish the cost of subscription as far as possible. While in many instances our requests for exchanges have been complied with, in others it has been found impossible to obtain subscriptions on this basis, one reason being that the publications of the bureau appear in the form of bulletins and not as a journal. Therefore, from a financial standpoint it would seem advisable to send out the work of the bureau as a scientific journal, which should have the usual characteristics of publications

of this class. The standard, as has been the case in the bulletins, should be of the highest, and the recognition which such a journal would receive, coming as it does from one of the chief scientific institutions of the Tropics, would be immediate. The cost would not very much exceed that of the bulletins, and it is certain that a journal would not only receive more attention from our coworkers, but it would also be given more general reviews in the various publications of the world. By this means the bureau could demand exchanges, and our list of subscriptions paid for could be reduced to a minimum. Probably also with exchanges bringing the journal before the world by means of reviews, it would be possible and feasible to charge an annual subscription to all other persons or societies who might desire the publication for themselves. The greatest objection would be the variety of work which would find a place in its pages, so that specialists, who cared only for particular things, would find articles in which they are interested appearing only at certain intervals, and therefore a large amount of material would be sent to them which would be valueless, but this difficulty could be met by issuing reprints of papers which would go only to persons who would be especially benefited by them, whereas the additional cost would be met by a subscription price.

BIOLOGICAL LABORATORY.

During the past year continued attention was given to the development of the pathological museum, many specimens of great value being added to it. The collection is now mounted so as to be of the greatest possible use both to the laboratory force and to the physicians of the city. The specimens obtained at autopsy are immediately prepared by Mr. Willyoung, and the appearance of the museum reflects great credit both on him and on the director of the biological laboratory, whose interest in the collection has been a constant one. For some of the specimens we are indebted to Doctors Brinckerhoff and Tyzzer, who came here to take up certain phases of the work on variola begun by Doctor Councilman, of Harvard University. Doctor Tyzzer left Manila on December 15 and Doctor Brinckerhoff a few months later, returning to America via the Suez Canal. Both of these gentlemen made the best use of their time while in the laboratories and the results of their work will be published after they have been thoroughly studied in America. The thanks of the bureau are due to Doctors Brinckerhoff and Tyzzer for the interest which they displayed in the various branches of our work.

During the year Dr. William B. Wherry resigned his position as bacteriologist, after completing the publication of four papers of undoubted merit. The further particulars in regard to this work will be found in the report of the director of the biological laboratory. Dr. Wherry was succeeded by Dr. Ralph T. Edwards.

Doctor Strong has continued work on his cholera vaccine, and of late has found an opportunity to put it to a practical test by inoculating a large number of the inmates of the Bilibid prison during the recent outbreak of cholera in that institution. The inoculations have all resulted practically without local irritation and with but a slight, though pronounced, general reaction. The prisoners treated were not inconvenienced. A study of the blood immunity obtained in these persons will be made. Cholera has disappeared from the confines of Bilibid, and consequently Doctor Strong is not in a position to state by actual evidence that intestinal immunity is conferred by reason of the immunity in the blood, but in any event a study of so many human inoculations will be a most valuable criterion as to the value of the vaccine in times of epidemic. Theoretically, it would seem not only reasonable but almost certain that blood immunity, if we consider the histological and physiological relations of the blood to the lining walls of the intestine, would also confer immunity to the inoculated individual from infection *per oram*.

Doctor Musgrave left for the United States on leave of absence on May 23, after completing a further amount of work on the pathology of intestinal amœbiasis in conjunction with Doctor Woolley. In addition, Doctor Musgrave has taken the opportunity of attending the Portland meeting of the American Medical Association and presenting a review of the work which he has done on the question of amœbic dysentery. This review excited general interest and directed the attention of physicians in America to the work of the laboratories even to a greater degree than has heretofore been the case.

Dr. J. B. Thomas, attending physician and surgeon of the civil sanitarium at Baguio, Benguet, also worked in the laboratories during several months and published a paper on the action of various chemical substances on cultures of amœbæ. This paper had especial reference to the destruction of amœbæ by a number of well-known chemical substances in solution, the object being to determine the exact value of local disinfectants.

During the year the laboratory has been enabled to render considerable assistance to physicians of the Army and of the Navy, both by reason of the medical library as well as by consultation.

Work on the cholera vaccine and on amœbæ is being continued. For the purpose of following out the physiological chemistry of the latter organism a large Vaughan incubator, capable of cultivating large quantities of organisms at one time, has been ordered. In addi-

tion to the above Doctor Edwards has devoted some time to the culture of the fungi and bacteria which grow upon fresh cocoanut meat and upon copra for the purpose of demonstrating the organisms which cause rancidity. The results will be published in a bulletin on the subject which is now in the process of preparation.

The discussion of the routine work of the biological laboratory and further particulars in regard to the investigations carried on therein will be found in the report of the director of the biological laboratory. As is the case in other divisions, routine work takes precedence over everything else, and as a consequence it not infrequently happens that research work needs to be abandoned in favor of the other more pressing necessities. In a biological laboratory this is at times especially unfortunate, because much of the material used in investigations is of such a perishable nature that the loss in time by allowing such materials to stand is much greater than the actual hours devoted to routine work. It is to be hoped that when funds are available this condition in the biological laboratory can be remedied, because, while routine diagnoses of existing diseases are necessary for the guarding of the public and individual health, nevertheless advances in new methods of studying, diagnosing, and treating diseases can only be made after research work of the most painstaking character. The improvement brought about in the treatment of amœbic dysentery and the preparation of a new cholera vaccine should demonstrate how much greater the final results of research are than those of work in any other direction.

CHEMICAL LABORATORY.

The chemical laboratory, more than the others, was handicapped in the old building by lack of proper facilities, because chemical work can at the present time only be carried on by means of modern appliances and apparatus. The results of the change to the present quarters are already noticed in the research work which is being accomplished. Doctor Clover has undertaken a study of gums and resins and has already differentiated a number of chemical substances in the wood oils and in the Manila elemi. The portion on wood oils is in condition for publication. The work on elemi is much more difficult. The sesquiterpenes contained therein in large quantities are extremely interesting and worthy of study, but it is only by such study that a proper commercial use for this substance can be discovered and the value of the product, which could be obtained in large quantities in the Philippine Islands, enhanced.

During the absence of the superintendent of government laboratories, Doctor Clover was acting director of the chemical laboratory, and in this capacity took charge of the routine work, as well as of his own investigations. At the present time he continues in immediate direction of the details of the analyses brought into the laboratory, the actual work being carried out by the various members of the force.

Mr. Walker, as has been mentioned above, has found time to continue and practically to complete his work on copra and cocoanut oil, with the exception of the changes which take place in the germinating nut. This work will be published in conjunction with that of others on *Cocos nucifera*, and when published will form a résumé of all the practical points discovered in this laboratory and will be of use as a guide to planters and oil makers.

Mr. Richmond has begun an investigation of the fiber plants to be considered in the paper-making industry. Apparatus for this work has been purchased or manufactured in Manila, and the results so far have been extremely encouraging. A number of common grasses, such as the two varieties of cogon, certain fiber wastes like those of abacá and maguey, some palm stems and tree trunks, have already been investigated. Further particulars will be found in the report of Dr. A. M. Clover.

Mr. Fox has devoted himself entirely to assays and to mineral analyses. It must be realized that a mineral analysis, when accurately performed, is one of the most tedious and time-taking operations which can come to a chemist. Good mineral analysts, it might be said, "are born, not made." Many chemists, however talented, never acquire the patience or manipulative skill to obtain accurate results in this direction. Therefore it is evident that if we wish in any degree to cover the field of mineral analyses in the Philippine Islands as it should be done, and if we wish to acquire the information in regard to our mineral resources which is absolutely necessary to their development, more mineral analysts will be needed. One man can not accomplish more than a certain amount. Hurried work is worse than useless, and careful, painstaking, and accurate results can with the present force only be brought out in limited quantities. We have in the islands limestones, coals, gold-bearing and other ores and countless rocks and minerals the analysis of which would, in addition to assisting the operation of the mining bureau, be of incalculable value in giving us an understanding of the actual conditions which surround us. One question has frequently been brought to the attention of the chief of the mining bureau and also to that of the laboratories. This is the one as to whether certain ores submitted can be worked by the cyanide process and what the

results in gold value of such a process would be. It is scarcely possible to give entirely satisfactory answers where laboratory methods alone are used, and therefore it would seem not only to be profitable, but also expedient to place in the laboratories a small stamp mill and cyanide plant, so that miners could bring their ores to the laboratory and have demonstrated to them by practical results just what could be expected. Such model plants are made and are purchasable in the United States, and it is hoped that sufficient funds will be available to undertake this class of work. The question of the gas values and coking properties of our coals is also one which needs consideration, and therefore the installation of some small coal-gas retorts and a gasometer for experimental purposes would be extremely advisable. The cyanide plant and the gas retorts obviously could not be placed in the laboratory building, but should be installed in a shed of rough materials, or possibly space could be provided for them in one of the wings which were originally contemplated.

The subject of weights and measures was taken up by Dr. Gilbert N. Lewis, the physical chemist in charge of this division of weights and measures. He made a careful study of the conditions in the islands and embodied his results in a report which was made to the honorable the secretary of the interior. At the same time Doctor Lewis suggested a law which was designed to correct the existing evils, and to change all of the weights and measures in the islands to the metric system within the next eight or ten years. In the meanwhile some of the local weights and measures which exist will be retained, with the proviso that they are reduced to a reasonable equivalent in the metric system. Through the United States ambassador at Paris certain standard weights and measures to serve as the chief normals of the islands have been ordered, and a number of sets of less accuracy, but still entirely adapted to the purpose, have been bought by the insular purchasing agent for distribution to the provincial governments. A distinction must be drawn between weights and measures and their standardization and the weighing and measuring as it is carried on in the Philippine Islands. According to the recommendations of Doctor Lewis, the first portion of the work—that is, the standardization—can be done in the laboratories, but the second portion, that of regulating weighing and measuring in the islands, had best be transferred to a bureau which has agents in many localities, and the bureau which most naturally suggests itself for this purpose is that of the internal revenue. It would seem feasible to regulate and adjust weighing and measuring and the weights and measures in use in the provinces by means of internal-revenue officers and to collect the charges for this work by internal-revenue stamps, as is the case with the products subject to tax under the internal-revenue law. The actual work of physical chemistry in the laboratories has been somewhat limited, Doctor Lewis having devoted a great deal of time to work just mentioned. I regret to state that Doctor Lewis will soon leave for the United States, and in choosing his successor I believe it will be feasible to obtain a man who is not only thoroughly conversant with weighing and measuring and with the principles of physical chemistry in sufficient degree to carry out the work necessary in that line, but who is also interested and who would devote himself to mineral analysis in the form of its most modern development and who would be able to do research work in inorganic chemistry.

Mr. Charles L. Bliss, physiological chemist, resigned on August 14, 1905, after three years of service in the islands. His work always was of the most painstaking and accurate character. His successor has not yet been selected in the United States.

SERUM LABORATORY.

During the year the work of the serum laboratory has continued according to the plan adopted in the past. The appearance in epidemic form of more or less severity of rinderpest in various parts of the islands has brought upon the laboratories a great demand for the serum. During a portion of the year, after the shipment of government cattle from Shanghai ceased, it was very difficult to obtain animals for virulent blood, our former arrangement having been that with each shipment of Shanghai cattle a certain number of virulent blood animals were sent to the laboratories. As a consequence, during the months of May and June of this year the production of rinderpest serum fell off to such an extent that the demands of the board of health could not be met and veterinarians were sent into the provinces with an insufficient supply. This trouble has of late been obviated by bringing to Manila cattle from the island of Sibuyan, where rinderpest has never appeared. These animals have all proven to be highly susceptible and the supply of blood, so long as they can be obtained, will be sufficient to meet the needs of the future. The serum animals have been transferred from the insular purchasing agent on memorandum receipt, the laboratories returning them to the bureau to which they belong when they are no longer useful for the preparation of serum. The number of animals still left on Burias Island, the place where the government cattle were sent, is now about 70, so that this supply will probably suffice for nine months or a year. After this time the question of obtaining serum animals will once more become serious. The laboratories for the past year have not used the original method of simultaneous inoculation. Instead,

they have given serum to the animals upon receipt at the laboratory and a few days later have given virulent blood. The results have been better as regards mortality than they were when blood and serum were given at the same time. During the year no animals were lost in the laboratory as a result of inoculation against rinderpest. This work has been carried on by Doctor Sorrell and the uniformly good results are due to his energy and painstaking care. His responsibilities involve not only the care of over 100 cattle and a varying number of calves, but also the executive control of about 20 laborers and foremen, personal attention to inoculations and bleedings and veterinary services in guarding the health of the animals in the institution. Economy in operation, so as to cut down the cost of production, is constantly in the minds of the employees. Several variations in the feed rations have been tried during the past year, and at present analyses are being made in the chemical laboratory to determine the cheapest and best theoretical food which can be given to the cattle. One trouble in the serum laboratory at San Lázaro has been found in the recurrence, at times, of foot-and-mouth disease. Whenever this happens a great amount of extra work in the treatment, isolation, and care of the animals is involved. The disease is so prevalent in Manila that it has been found impossible entirely to exclude it from the grounds. A complication of foot-and-mouth disease with rinderpest is practically fatal in all cases, whereas foot-and-mouth disease alone can be cured with more or less readiness.

Since the beginning of the cholera outbreak in Manila, Doctor Ruediger has given practically his entire time to the preparation of cholera vaccine. This is an extremely painstaking and difficult operation. Slight variation in the technique may result in the complete loss of a large amount of material and time, besides which work carried on day by day without change is of a very monotonous character. It is greatly to the credit of Doctor Ruediger that he has taken hold of this difficult problem and carried it on in a successful manner, so as to produce an efficient and satisfactory prophylactic. The position of assistant director of the serum laboratory has been vacant during the entire year. At the discussion of the last appropriation bill this position was not continued by the Commission because, as was stated at the time, no man was available. Doctor Ruediger has now been with the bureau for two years. He has during this time devoted himself exclusively to serums and vaccines, and it would seem only proper and just to re-create the position and to appoint Doctor Ruediger therein.

BOTANISTS AND ENTOMOLOGISTS.

The work of the botanists and entomologists has already been discussed at sufficient length in the introduction to this report.

ENGINEERING FORCE.

The mechanical plant of the bureau has been in charge of Mr. William P. Williams, who was transferred to this bureau from the bureau of architecture, he having been present throughout at the construction of the building and at the installation of its power plant, and therefore is familiar with every detail of the installation and of the piping within the building. The engines throughout the year have been alternated, one unit only being used at a time, and thus ample opportunity for minor repairs has been given. The coal consumption has been kept at a minimum, and whenever practicable the engines have been shut off at the close of the working hours of the laboratory. However, occasions arise, such as the testing of the refrigerating plant or at times when important work would be destroyed by an interruption, when the machinery has been continued for a longer period. The average run per day is about nine hours and the amount of coal consumed approximately one ton. The gas machine has operated satisfactorily without any breakdown whatsoever and with the melting out of only one retort, so that the average life of a gas retort under present conditions is approximately one year, while in the old laboratory from five to six months was all that could be counted on. The difference is due to the care with which gas making can be carried on under the direction of an experienced engineer. At no time during the year has the laboratory work been interrupted through the lack of gas. In a building of this kind, with several hundred valves, stopcocks, and many hundred feet of piping, with refrigerating machinery and electrical machinery of all kinds, minor repairs, if the plant is to be kept in a proper condition, must constantly be made. The same is true of the laboratory apparatus. Much of it has been in use for several years and repairs and alterations are therefore becoming necessary. Another factor of importance is the gradual substitution of water baths and other appliances heated with gas by an arrangement by which steam heat alone will be utilized on this class of apparatus. The saving is obvious. Gas costs us considerably more than steam, and every change by which the use of the former can be eliminated is so much gained. These alterations, to enable steam heating to be applied to much of the original apparatus, involve

work on the part of the engineering force. In addition to the above, many appliances have been constructed on the premises, although a great deal of work has needed to be given out. From the above brief account of the duties which fall upon the engineer and his staff it is evident that an economy would be effected by providing another assistant. It was at first thought that an instrument maker, who would devote his time to nothing but apparatus, would be absolutely essential to the bureau, but it is probable that, for a year at least, the needs can be met by engaging a native workman of experience, solely to be employed on the work of repairs and alterations under the direction of the engineer. Obviously, at the present time the engine-room force has for its main purpose the care of the engines, boilers and plant, and work on the piping system. Alterations for the use of steam in place of gas and the making of appliances and instruments necessary for specific work has to be done at odd moments or to be given to outside manufacturers. By this means great delays result, and in many instances delay means loss in money. It is evident then that from a business standpoint the allowing of this assistant to the engineer is most essential, besides which it is obviously a waste of money to have a man on the salary of $1,800 a year doing work which can be accomplished by an employee at $30 a month.

CLERICAL FORCE.

The clerical force of the bureau has been kept busy to its utmost capacity. The increase in the work has been very marked, and the number of clerks is so small that when one is away on vacation or otherwise the strain upon the remainder is very great. An increase by at least one clerk during the next year will probably be necessary.

Mr. Peabody, chief clerk of the bureau, resigned on April 30, and his place was taken by Mr. Charles S. Sly, who has been connected with the bureau for the past four years.

CONCLUSION.

The year has been marked by a steady growth in the work of the laboratory and in the results accomplished. Gradually, our institution is becoming known throughout the world and the high standard of its publications is being recognized. We have in the bureau of laboratories an institution which not only fills the needs of the community in answering questions of a scientific nature which demand an immediate answer, but which is also endeavoring to advance our knowledge of the conditions which surround us and to discover means to improve them. It should be an organization in which everyone should take an interest and a pride, as its very existence typifies the trend of modern thought. It should be regarded in the same light in the Philippine Islands as it is among the educated classes at home, and every effort should be made to keep its dignity and its standing unimpaired. This can best be accomplished by maintaining a high standard among its employees. As all of the scientific workers are university graduates and men who have been accustomed to good surroundings at home, it is often a disappointment to them, on reaching Manila, to learn that work of a scientific character has not the regard of the community at large which it really should have. With the continued support of the government, it is hoped that in time these conditions will be altered and funds will be available for the payment of better salaries and for placing the employees upon a better footing. It is only by continual growth that an institution can avoid stagnation. Standing still in reality means retrogression, and our constant endeavor should be to have each year show a distinct and marked advance over the preceding ones.

I am, very respectfully,

PAUL C. FREER,
Superintendent Government Laboratories.

The SECRETARY of the INTERIOR,
Manila, P. I.

REPORT OF THE LIBRARIAN.

The following is the report of Mr. C. J. Arnell, acting librarian, for the period from September 1, 1904, to August 31, 1905:

During the past year the library has been greatly enlarged, both by transfer and by purchase, as well as by gifts and the arrangement of exchanges with other scientific institutions.

TRANSFERS.

By far the greatest addition has been brought about by the centralization of the various libraries of the department of the interior, by which 6,799 volumes have been transferred to this library. The number of volumes received from each bureau is as follows: Bureau of

agriculture, 1,359; bureau of forestry, 1,766; bureau of mining, 1,507; bureau of public health, 145; bureau of public lands, 115; ethnological survey, 1,216; Philippine civil hospital, 28; public health and marine-hospital service, 151, and the Philippine exposition board, 512. As is evident from the character of the bureaus from which the transfers were made that not only has the size of the central library been greatly increased, but the scope of subject-matter comprehended therein has been considerably broadened. The new acquisitions include among others works on land and mining laws, methods and products of agriculture and manufacture, mining and mineral resources, surveying and engineering, mineral and thermal springs, meteorology, astronomy, navigation, and forestry methods, resources, legislation, and reports.

An addition which has proved to be of very great general interest and has been drawn upon extensively is a valuable collection of works from the ethological survey, comprising some of the best literature on ethnology, archæology, sociology, history, biography, and travel, as well as grammars and dictionaries of Philippine and other Malay dialects and languages of related stock, in addition to a large collection of native literature, representing most of what has been done in a literary way in the insular dialects.

The books thus transferred have been catalogued and stamped as the property of the central library, but owing to the frequency with which many of them are consulted by the staffs of the bureaus to which they originally belonged and the inconvenience caused by the distance of the latter from the central library, authority was granted for the retention by these bureaus, on memorandum receipt, of such books as are constantly used in their work. However, these books are accessible for reference in the same manner as others and can be secured on short notice. Most of the literature from the ethnological survey has been allowed to remain on the shelves of the central library, as has also that from the Philippine exposition board.

PURCHASES.

But few new orders for books have been made during the past year, amounting in all to 51 volumes. However, about 707 have been received on unfilled orders of previous years. One reason for this interval in procuring new material is found in the fact that the library staff was not able to keep up with the necessary details of cataloguing, shelving, and examining vouchers for payment, so that it was decided thoroughly to classify all books received, or to be received, on outstanding orders, before making any further extensive additions. There are still undelivered, including text-books and complete sets of periodicals, about 1,300 volumes. Some of these are out of print, the only way to secure them being to advertise for second-hand copies. Our agents both in America and Europe are on a constant outlook for available sets, but at best the process is slow, and there seems to be little probability of ever securing complete series of certain of the periodicals.

Sets of periodicals and books received during the year.

PERIODICALS.

Annales de chimie et de physique, vols. 1–21, 7th series.
Annales de la Société entomologique de Belgique, vols. 1–46, 1857–1902.
Archiv für mikroskopische Anatomie und Entwicklungsgeschichte, vols. 1–57, 1865–1901.
Berichte der deutschen botanischen Gesellschaft, vols. 1–21, 1883–1903.
Berliner entomologische Zeitschrift, vols. 1–49, 1857–1904.
Berliner und deutsche entomologische Zeitschrift, 1857–1880.
Berliner thierärztliche Wochenschrift, 1885–1902.
Bonplandia, Zeitschrift für die gesammte Botanik, vols. 1–10, 1853–1862.
Bulletin de la Société entomologique de France, 1885–1902.
Bulletin of the British Ornithologists' Club, vols. 5–13, 1895–1903.
Hygienische Rundschau, vols. 1–13, 1894–1903.
Ibis, vols. 1–9, 1895–1903.
Journal of the American Chemical Society, vols. 1–25, 1879–1903.
Journal of the American Medical Association, vols. 1–35, 1883–1900.
Journal of Medical Research, vols. 1–5, new series, 1901–1904.
Journal de médecine vétérinaire et de zootechnie, vols. 1–6, 5th series, 1897–1902.
Journal of the Asiatic Society of Bengal, part 2, Natural History, vols. 34–71, 1865–1902.
Just's botanischer Jahresbericht, vols. 2–31, 1873–1903.
Proceedings of the American Chemical Society, vols. 1–2, 1876–78.
Sitzungsberichte der kaiserlichen Akademie der Wissenschaften, mathematisch-natur wissenschaftliche Klasse, vols. 1–112, 1848–1903.
Transactions of the Linnean Society, 2d series, Botany, vols. 1–6, 1875–1904.

These sets are all brought up to date by current subscriptions, except of course where publication has been discontinued.

Books:

Medical	13
Chemical	5
Entomological	16
Botanical	59
Miscellaneous	6

Sets of periodicals and books ordered, but not yet delivered.

PERIODICALS.

Allgemeines Journal der Chemie (Scherer), 1798–1803.
Annali d' igiene sperimentale, to 1901.
Arbeiten aus dem kaiserlichen Gesundheitsamte, vols. 1–19.
Arbeiten des botanischen Instituts zu Würzburg, 3 vols., 1874–1888.
Arbeiten des pharmacologischen Instituts zu Dorpat, to 1902.
Archiv der Pharmacie, vols. 1–238.
Archiv für Anatomie und Physiologie, 1825–1832.
Archiv für Dermatologie und Syphilis, vols. 1–67.
Archiv für experimentelle Pathologie und Pharmakologie, vols. 1–48.
Archiv für Hygiene, vols. 1–39.
Archiv für klinische Chirurgie (Langenbeck), vols. 1–68.
Archiv für Verdauungskrankheiten, vols. 1–8.
Archives d'anatomie microscopique, vols. 1–5.
Archivio per le scienze mediche, Torino, vols. 1–24.
Berichte aus dem physiologischen Laboratorium und der Versuchsanstalt des landwirtschaftlichen Instituts der Universität Halle, to 1903.
Berichte der schweizerischen botanischen Gesellschaft, 1891–1901.
Botanical Magazine, Tokyo, 1904.
Botanische Mitteilungen aus den Tropen (Schimper), 1888–1901.
Centralblatt für Agriculturchemie (Biedermanns), vols. 1–31.
Centralblatt für Gynäkologie, vols. 1–26.
Centralblatt für Nahrungs-und Genussmittel-Chemie. Complete.
Chemische Industrie (Jacobson), vols. 1–23.
Comptes rendus . . . de la Société de biologie, vols. 1–52.
Deutsche medicinische Wochenschrift, vols. 1–26.
Diagnoses phanerogamarum, beginning with first number.
Historische Studien aus dem pharmakologischen Institut der kaiserlichen Universität Dorpat, to 1903.
Hooker's Journal of Botany and Kew Garden Miscellany, 1849–1857.
Indian Medical Gazette, vols. 1–37.
Jahresbericht der Pharmacie, vols. 1–33.
Jahresbericht über die Leistungen der chemischen Technologie (Fischer), vols. 1–47.
Journal of Applied Microscopy and Laboratory Methods, vols. 1–5.
Journal of Botany, British and Foreign, vols. 1–40.
Journal für Chemie, Physik und Mineralogie (von Gehlen), 1807–1809.
Journal of Comparative Pathology and Therapeutics, vols. 1–15.
Journal of Tropical Medicine, vols. 1–5.
London Journal of Botany (Hooker), 1842–1848.
Memoirs from the Biological Laboratory of the Johns Hopkins University, vol. 1.
Mitteilungen aus der medicinischen Facultät der kaiserlich-japanischen Universität zu Tokyo (Teikoku Daigaku Chikuyo Iken), vols. 1–5.
Münchener medicinische Wochenschrift, vols. 1–47.
Neues Journal für Chemie (von Gehlen), 1869–79.
Prager medicinische Wochenschrift, vols. 1–15.
Repertorium der analytischen Chemie (Analytischer Chemiker Verein), to 1887.
Semaine médicale, vols. 1–22.
St. Louis and Canadian Photographer, vol. 26, 1902.
Studies from the Department of Pathology of the College of Physicians and Surgeons, Columbia University. Complete.
Transactions of the Association of American Physicians.
University of Pennsylvania, Medical Bulletin, vols. 1–15.
Untersuchungen über die Gesammtgebiete der Mykologie, 1872–1889.
Wiener medicinische Wochenschrift, vols. 1–52.
Zeitschrift für angewandte Mikroskopie, vols. 1–6.
Zeitschrift für Nahrungsmittel-Untersuchung, Hygiene und Warenkunde. Complete.
Zeitschrift für öffentliche Chemie, vols. 1–6.
Zeitschrift für Pflanzenkrankheiten, vols. 1–12.

Current subscriptions of most of the foregoing periodicals are on file.

Books:

Medical	11
Chemical	32
Entomological	77
Botanical	10

SUBSCRIPTIONS.

Our subscription list at present consists of 261 of the leading scientific periodicals of the world, covering general science, microscopy, physics, chemistry, biology, botany, general zoology, entomology, ornithology, general medicine, hygiene, and sanitation, pharmacy and therapeutics, pathology, bacteriology, surgery, gynecology, dentistry, comparative and veterinary medicine, engineering, agriculture, photography, and library science.

The following were added during the past year: Analyst; Archives italiennes de biologie; Association of Medical Librarians; Beiträge zur chemischen Physiologie und Pathologie; British Journal of Dermatology; Deutsche Klinik; Fortschritte der Veterinär-Hygiene; Giornale della Reale Società italiana d' igiene, Milano; Journal of Experimental Zoology; London Practitioner; Zeitschrift für Heilkunde.

Besides the subscriptions already mentioned, the plan of library centralization above referred to caused to be added to our list a large number of subscriptions dealing with mining, forestry, agriculture, ethnology, and related subjects. These are kept on file in their respective bureaus until the completion of the annual series, when they are transferred to the central library and bound. Beginning with the calendar year 1906 all subscriptions will be attended to by this bureau.

A number of new periodicals have been acquired through exchange; these will be referred to below.

EXCHANGES.

During the past year the time was thought ripe for a systematic effort directed toward the opening of exchanges with the leading scientific institutions and journals, both private and governmental, throughout the world. The research work of the bureau in its various branches is well underway, and the reports of its results are appearing at frequent enough intervals and are of a character sufficiently general to make the prospects of large returns from this source very hopeful. Although it is too early to judge definitely, as in most cases answers to our proposals are yet forthcoming and in not a few final arrangements must await the annual association meetings convened during the latter part of the year, the attitude thus far manifested in the replies received confirms the expectation of good results. The benefits of such a scheme are of course obvious; it will mean a financial saving as well as the acquisition of a large amount of literature that otherwise would not have been available. It is important that the matter of exchanges be included in the general scheme of centralization, as the cooperation of the various bureaus will greatly enhance the value of results. In this connection it should be mentioned that one important scientific institution which responded to our proposal signified its willingness to furnish us a complete set of its publications dating back over twenty years in return for the bulletins of all the bureaus of the Department of the Interior, whereas if each bureau should desire exchange separately the best it could do would be to send its current issues beginning with the date on which exchange was opened.

While, as above stated, it is as yet too early for replies to the larger part of our proposals, the following have already completed arrangements for exchange:

Academy of Natural Sciences, Philadelphia, Pa. (Proceedings.)
Agricultural Society of Ceylon, Colombo, Ceylon. (Bulletins. Tropical Agriculturist and Magazine of the Ceylon Agricultural Society.)
Albany Institute and Historical and Art Society, Albany, N. Y. (Proceedings.)
Asiatic Society of Bengal, Calcutta, India. (Journal and Proceedings. Scientific Memoirs.)
Berliner entomologischer Verein, Berlin, Germany. (Zeitschrift.)
Bernice Pauahi Bishop Museum, Honolulu, H. I. (Memoirs. Occasional Papers. Fauna hawaiiensis.)
Board of Commissioners of Agriculture and Forestry, Honolulu, H. I. (Reports. The Hawaiian Forester and Agriculturist.)
Brooklyn Institute of Arts and Sciences, Brooklyn, N. Y.
Buffalo Society of Natural Sciences, Buffalo, N. Y.
California Academy of Sciences, San Francisco, Cal. (Proceedings: Botany, Geology, Mathematics-Physics, Zoology. Occasional papers.)
Carnegie Institution, Washington, D. C. (Memoirs. Yearbook.)
Colonial Office, Ministry of Foreign Affairs, France.
Connecticut Geological and Natural History Survey, Hartford, Conn. (Bulletins. Biennial reports.)

Department of Agriculture, Perth, Western Australia. (Pamphlets. Journal.)
Departement van Landbouw, Batavia, Java. (Mededeelingen.)
Deutsche entomologische Gesellschaft, Berlin, Germany. (Zeitschrift.)
Field Columbian Museum, Chicago, Ill.
Imperial University of Tokyo, Japan, Science College. (Journal.)
Institute for Medical Research, Federated Malay States, Farther India. (Studies.)
Iowa Journal of History and Politics, Iowa City, Iowa.
Königl. botan. Garten und Museum zu Berlin, Berlin, Germany. (Notizblatt.)
Lands Plantentuin, Batavia, Java. (Mededeelingen.)
Library of Congress, Washington, D. C. (Annual reports. Catalogues.)
Linnean Society of New South Wales, Sydney, New South Wales. (Proceedings.)
Maine Academy of Science, Portland, Me. (Journal.)
New York Botanical Garden, New York City. (Bulletin.)
Pasteur Institute, Kasauli, India.
Revista de Medicina Tropical, Habana, Cuba.
Revue générale des sciences, Paris, France.
Rhode Island Health Department, Providence, R. I. (Reports.)
Roger Williams Park Museum, Providence, R. I.
Royal Academy of Science, Stockholm, Sweden. (Arkiv för Botanik. Arkiv för Zoologi.)
Royal Botanic Garden, Sibpur, Calcutta, India. (Records of the Botanical Survey of India. Pamphlets.)
Royal Botanic Garden, Peradeniya, Ceylon. (Circulars. Agricultural Journal.)
Senckenbergische natürforschende Gesellschaft, Frankfurt a. M., Germany. (Berichte.)
Singapore Municipal Health Office, Singapore, Straits Settlements. (Reports.)
Smithsonian Institution, Washington, D. C. (Annual reports. Miscellaneous collections, etc.)
Société Impériale des Naturalistes, Moscow, Russia. (Bulletin.)
Tokyo Botanical Society, Botanic Garden, Tokyo, Japan. (Magazine.)
Tokyo Zoological Society, Tokyo, Japan.
University of California, Berkeley, Cal. (University publications.)
University of Illinois, Urbana, Ill. (Studies.)
Washington Academy of Sciences, Washington, D. C. (Proceedings.)
Wellcome Research Laboratories at the Gordon Memorial College, Khartoum.

We wish to express our thanks to those who have so courteously responded to our proposal. Especial attention should be called to those institutions which have offered to present us, or have already done so as far as available, with the complete series of their publications from the first issue, namely:

Bernice Pauahi Bishop Museum, 1898 to date.
California Academy of Sciences, 1898 to date.
Carnegie Institution, 1902 to date.
Lands Plantentuin, from 1891 to date.
Linnean Society of New South Wales, from 1882 to date.
New York Botanical Garden (Bulletin), from 1896 to date.
Royal Academy of Science, Stockholm (Arkiv för Zoologi), from 1903 to date.
Senckenbergische natürforschende Gesellschaft, from 1868 to date.
Washington Academy of Sciences, from 1898 to date.

It is hoped to have in our files in the near future a large number of periodicals, memoirs, and board of health reports in the Spanish language dealing with tropical diseases, sanitation, and industries, as Mexico and South America have been thoroughly covered in our exchange correspondence. Special efforts have also been made toward securing exchanges from other parts of the Tropics as well as the Orient.

We wish to avail ourselves here of the opportunity to thank the various agricultural experiment stations of the United States for the most prompt and generous manner in which they furnished at our request sets of their past publications, in some instances sacrificing rare and valuable reports in order to complete our files of their literature, which is largely consulted both by the bureau of agriculture and our own bureau.

GIFTS.

The library has been fortunate the past year in securing a very large number of valuable publications by gift from the following persons: Hon. Dean C. Worcester, secretary of the interior, Manila; Dr. Paul C. Freer, superintendent of government laboratories, Manila; Dr. Richard P. Strong, director biological laboratory, Manila; Dr. W. E. Musgrave, Manila; Maj. E. C. Carter, Manila; Dr. Louis Ottolfy Manila; Dr. F. A. Thanisch, Manila; Dr.

Gilbert N. Lewis, Manila; Mr. Elmer D. Merrill, Manila; Mr. Charles L. Bliss, Manila; Mr. Richard C. McGregor, Manila; Miss Mary Polk, Manila.

It is hardly necessary to say that especial thanks are due to those whose names appear on the preceding list, for the interest shown and the assistance given in bringing the library up to a higher standard of usefulness. Particularly do we desire to thank Hon. Dean C. Worcester, secretary of the interior, for his numerous contributions, as well as for the many measures he has taken looking toward the improvement of the library and the constant interest he has shown in the details of its organization.

Through an agreement effected by Mr. Worcester with Mr. Ayer, of Chicago, to furnish the latter with a collection of Philippine photographs this gentleman has volunteered to contribute to the library $500 United States currency in return for every 1,000 views, with descriptive matter, which he receives. The net income to the library from this source will be calculated by deducting the official sale price of the photographs from the total amount paid, the library to obtain the balance for general purposes. The income from this source will approximate $1,800 United States currency for this year, and as the arrangement will hold good in the future it will continue to bring to the library a certain fund each year.

ROUTINE WORK.

A large part of the past year was devoted to the preparation of a library catalogue under the supervision of Miss Mary Polk, librarian, which was issued, together with a "Description of the New Buildings," by Dr. Paul C. Freer, superintendent of government laboratories, in the form of Bulletin No. 22. The preparation of such a catalogue is necessarily a tedious and painstaking task, and owing to the lack of sufficient assistance and the necessity of bringing this work to completion as early as possible other phases of library work had partly to be neglected during its progress. Since the catalogue was issued the library has been materially enlarged by further transfers from the mining bureau, the exposition board, and the ethnological survey, as well as from other sources. It is hoped to publish a list of these additions in the form of a supplementary catalogue.

While the printed catalogue, in which authors are arranged alphabetically under subjects, including an author index, serves as a fairly good aid in determining what there is in the library, one unacquainted with the disposition of the books on the shelves must have recourse to the librarian in locating for him the book desired. However, this disadvantage will be obviated and the accessibility of the library greatly enhanced by the application of the Dewey system, the preparation of which is now in progress. One of the superior features of the Dewey system of classification is that it serves at once both as an author and a subject index.

The financial record—showing for each book and subscription, the date of order, the number of the requisition, the date of receipt, the date of payment, the number of voucher on which paid, and the price in Philippine currency—which by reason of the pressure of work already referred to had fallen greatly in arrears, is now well-nigh brought up to date. The accession books, both for subscriptions and for single volumes, are nearly completed, as are also the other library records.

Owing to the constantly growing amount of literature received through exchange and with a view to facilitating and systematizing the operation of this important department of the library work, an independent card index has been begun, classified into medical, chemical, botanical, zoological, and general scientific institutions, and showing under each what publications have been received, as well as those given in return.

During the year 639 volumes have been prepared for binding. Books and periodicals have been bound as soon as the work of the laboratory would permit it, this being important, since, if allowed to remain in paper covers for a long period of time, they often become seriously damaged in use.

The library has been practically free from molds and insect pests. Only two cases were discovered, both in laboratory publications, in one of which a spider wasp, belonging to the family Larridæ, had built its nest, and in the other a termite, variously known as white ant and anay, had done slight damage; in both instances, however, the insects were either gone or dead when the cases came to our attention. The almost entire freedom from such pests is believed to be due largely to the efficacy of the varnish described in the last report and regularly applied to the books. Every book in the library has been periodically inspected and cleaned, and during the latter part of the year, on the discovery of the two cases mentioned above, a careful examination of the part of the library in which they occurred was made and extra precautions have since been taken.

USE OF THE LIBRARY.

The record of books borrowed shows a marked increase over last year in the extent to which the library has been consulted. Not only has it been used more extensively by the

members of our own laboratory staff, but the number of persons in other departments of the government service who have availed themselves of its privileges has been much greater. This is largely due to the fact that, since the removal of the library to its present central location, it has become more widely known and its facilities have been greatly improved.

An almost universal desire has been expressed by those now patronizing the library, as well as by others who would do so if the hours were adapted to their needs, that some arrangement be made for making it accessible outside the usual government hours. It is expected that steps may soon be taken toward extending the afternoon hours, and, if found feasible, toward keeping the reading room open on evenings.

Several requests have been made during the year for permission to take books to the provinces for the purpose of using them in the prosecution of scientific work. While the impossibility of complying with these requests is regretted, as in most cases such a privilege would under ordinary circumstances have been merited, it has been the definite policy of the library not to allow its books to go outside Manila, and an explicit provision to that effect has been incorporated in its rules. Should this provision be waived in the interests of one, impartiality would demand that it be done in the case of all, and it is unnecessary to explain why the results of such a plan would in the end be disastrous to the library, in a country where communication is slow and the safety of property uncertain.

Publications of the bureau of government laboratories.

No. 1. 1902. Biological laboratory: Preliminary Report of the Appearance in the Philippine Islands of a Disease Clinically Resembling Glanders. By R. P. Strong, M. D.

No. 2. 1902. Chemical laboratory: The Preparation of Benzoyl-Acetyl Peroxide and Its Use as an Intestinal Antiseptic in Cholera and Dysentery. Preliminary Notes. By Paul C. Freer, M. D., Ph. D.

No. 3. 1903. Biological laboratory: A Preliminary Report on Trypanosomiasis of Horses in the Philippine Islands. By W. E. Musgrave, M. D., and Norman Williamson.

No. 4. 1903. Serum laboratory: Preliminary Report on the Study of Rinderpest of Cattle and Carabaos in the Philippine Islands. By James W. Jobling, M. D.

No. 5. 1903. Biological laboratory: Trypanosoma and Trypanosomiasis, with Especial Reference to Surra in the Philippine Islands. By W. E. Musgrave, M. D., and Moses T. Clegg.

No. 6. 1903. I—New or Noteworthy Philippine Plants, I. II—The American Element in the Philippine Flora. By Elmer D. Merrill, botanist.

No. 7. 1903. Chemical laboratory: The Gutta-Percha and Rubber of the Philippine Islands. By Penoyer L. Sherman, jr., Ph. D.

No. 8. 1903. Dictionary of the Plant Names of the Philippine Islands. By Elmer D. Merrill, botanist.

No. 9. 1903. Biological laboratory: A Report on Hemorrhagic Septicæmia in Animals in the Philippine Islands. By Paul G. Woolley, M. D., and J. W. Jobling, M. D.

No. 10. 1903. Biological laboratory: Two Cases of a Peculiar Form of Hand Infection (Due to an Organism Resembling the Koch-Weeks Bacillus). By John R. McDill, M. D., and Wm. B. Wherry, M. D.

No. 11. 1903. Biological laboratory: Entomological Division, Bulletin No. 1: Preliminary Bulletin on Insects of the Cacao (Prepared Especially for the Benefit of Farmers). By Charles S. Banks, entomologist.

No. 12. 1903. Biological laboratory: Report on some Pulmonary Lesions Produced by the Bacillus Hemorrhagic Septicæmia of Carabaos. By Paul G. Woolley, M. D.

No. 13. 1904. Biological laboratory: A Fatal Infection by a Hitherto Undescribed Chromogenic Bacterium: Bacillus aureus fœtidus. By Maximilian Herzog, M. D.

No. 14. 1904. Serum laboratory: Texas Fever in the Philippine Islands and the Far East. By J. W. Jobling, M. D., and Paul G. Woolley, M. D. Biological laboratory: Entomological Division, Bulletin No. 2: The Australian Tick (*Boophilus australis* Fuller) in the Philippine Islands. By Charles S. Banks, entomologist.

No. 15. 1904. Biological and serum laboratories: Report on Bacillus Violaceous Manilæ: A Pathogenic Micro-Organism. By Paul G. Woolley, M. D.

No. 16. 1904. Biological laboratory: Protective Inoculation Against Asiatic Cholera: An Experimental Study. By Richard P. Strong, M. D.

No. 17. 1904. New or Noteworthy Philippine Plants, II. By Elmer D. Merrill, botanist.

No. 18. 1904. Biological laboratory: I—Amebas: Their Cultivation and Etiologic Significance. By W. E. Musgrave, M. D., and Moses T. Clegg. II—The Treatment of Intestinal Amebiasis (Amebic Dysentery) in the Tropics. By W. E. Musgrave.

No. 19. 1904. Biological laboratory: Some Observations on the Biology of Cholera Spirillum. By Wm. B. Wherry, M. D.

No. 20. 1904. Biological laboratory: I—Does Latent or Dormant Plague Exist Where the Disease is Endemic? By Maximilian Herzog, M. D., and Charles B. Hare. Serum laboratory: II—Broncho-Pneumonia of Cattle: Its Association with Bacillus Bovisepticus. By Paul G· Woolley, M. D., and Walter Sorrell, D. V. S. III—Pinto (Paño Blanco). By Paul G. Woolley, M. D. Chemical laboratory: IV—Notes on Analysis of the Water from the Manila Water Supply. By Charles L. Bliss. Serum laboratory: V—Framboesia: Its Occurrence in Natives in the Philippine Islands. By Paul G. Woolley, M. D.

No. 21. 1904. Biological laboratory: Some Questions Relating to the Virulence of Micro-Organisms with Particular reference to Their Immunizing Powers. By Richard P. Strong, M. D.

No. 22. 1904. Bureau of Government Laboratories: I—A Description of the New Buildings of the Bureau of Government Laboratories. By Paul C. Freer, M. D., Ph. D. II—A Catalogue of the Library of the Bureau of Government Laboratories. By Mary Polk, librarian.

No. 23. 1904. Biological laboratory: Plague: Bacteriology, Morbid Anatomy, and Histopathology (including a Consideration of Insects as Plague Carriers). By Maximilian Herzog, M. D.

No. 24. 1904. Biological laboratory: Glanders: Its Diagnosis and Prevention, together with a Report on Two Cases of Human Glanders Occurring in Manila and Some Notes on the Bacteriology and Polymorphism of Bacterium Mallei. By Wm. B. Wherry, M. D.

No. 25. 1904. Birds from the Islands of Romblón, Sibuyan, and Cresta de Gallo. By Richard C. McGregor.

No. 26. 1904. Biological laboratory: The Clinical and Pathological Significance of Balantidium Coli. By Richard P. Strong, M. D.

No. 27. 1904. A Review of the Identification of the Species Described in Blanco's Flora de Filipinas. By Elmer D. Merrill, botanist.

No. 28. 1904. I—The Polypodiaceæ of the Philippine Islands. II—Edible Philippine Fungi. By Edward B. Copeland, Ph. D.

No. 29. 1904. I—New or Noteworthy Philippine Plants, III. II—The Source of Manila Elemi. By Elmer D. Merrill, botanist.

No. 30. 1905. Chemical laboratory: I—Autocatalytic Decomposition of Silver Oxide. II—Hydration in Solution. By Gilbert N. Lewis, Ph. D.

Bulletins printed and distributed by the bureau of Government laboratories.

No.	Year.	Title and author.	Number distributed.
		Bulletins 1-15	3,944
16	1904	Biological laboratory: Protective Inoculation against Asiatic Cholera: An Experimental Study. By Richard P. Strong, M. D	1,237
17	1904	New or Noteworthy Philippine Plants, II. By Elmer D. Merrill, botanist	1,321
18	1904	Biological laboratory: I—Amebas: Their Cultivation and Etiologic Significance. By W. E. Musgrave, M. D., and Moses T. Clegg. II—The Treatment of Intestinal Amebiasis (Amebic Dysentery) in the Tropics. By W. E. Musgrave, M. D	1,508
19	1904	Biological laboratory: Some Observations on the Biology of the Choler Spirillum. By Wm. B. Wherry, M. D	1,015
20	1904	Biological laboratory: I—Does Latent or Dormant Plague Exist Where the Disease is Endemic? By Maximilian Herzog, M. D., and Charles B. Hare. Serum laboratory: II—Broncho-Pneumonia of Cattle: Its Association With Bacillus Bovisepticus. By Paul G. Woolley, M. D., and Walter Sorrel, D. V. S. III—Pinta (Paño Blanco). By Paul G. Woolley, M. D. Chemical laboratory: IV—Notes on Analysis of the Water from the Manila Water Supply. By Charles L. Bliss. Serum laboratory: V—Framboesia: Its Occurrence in Natives in the Philippine Islands. By Paul G. Woolley, M. D.	1,198
20	1904	Reprints	29
21	1904	Biological laboratory: Some Questions Relating to the Virulence of Micro-organisms with Particular Reference to their Immunizing Powers. By Richard P. Strong, M. D	1,183
22	1904	Bureau of Government laboratories: I—A Description of the New Buildings of the Bureau of Government Laboratories. By Paul C. Freer, M. D., Ph. D. II—A Catalogue of the Library of the Bureau of Government Laboratories. By Mary Polk, librarian	1,620
23	1904	Biological laboratory: Plague: Bacteriology, Morbid Anatomy, and Histopathology (Including a Consideration of Insects as Plague Carriers). By Maximilian Herzog, M. D	1,664
24	1904	Biological laboratory: Glanders: Its Diagnosis and Prevention, Together with a Report on Two Cases of Human Glanders Occurring in Manila and Some Notes on the Bacteriology and Polymorphism of Bacterium Mallei. By Wm. B. Wherry, M. D	1,191

Bulletins printed and distributed by the bureau of Government laboratories—Continued.

No.	Year.	Title and author.	Number distributed
25	1904	I—Birds from the Islands of Romblón, Sibuyan, and Cresta de Gallo. II—Further Notes on Birds from Ticao, Cuyo, Culión, Calayan, Lubang, and Luzón. By Richard C. McGregor	1,606
26	1904	Biological laboratory: The Clinical and Pathological Significance of Balantidium Coli. By Richard P. Strong, M. D	1,370
27	1904	A Review of the Identification of the Species Described in Blanco's Flora de Filipinas. By Elmer D. Merrill, botanist	1,299
28	1904	I—The Polypodiaceæ of the Philippine Islands. II—Edible Philippine Fungi. By Edward B. Copeland, Ph. D	1,470

Total number bulletins distributed 1905	21,655
Total number bulletins distributed 1904	20,114
Available for distribution	10,981
Total	52,750
Total number bulletins printed 1905	26,250
Total number bulletins printed 1904	26,500
Total	52,750

In conclusion it should be stated that Miss Mary Polk, librarian, has been absent on leave in the United States during the greater part of the year. The lack of her extended training and experience in library management has been sorely felt. However, what has been lost in the immediate supervision of the library has perhaps been more than compensated for by the interest which she has aroused both in America and Europe in our laboratory by the arrangement of exchanges and acquisition of gifts which she has effected, and by other benefits which have accrued through her efforts.

It should also be stated that during the absence of the librarian almost indispensable assistance has been rendered by Mr. Rufino del Rosario, library assistant, in keeping up to date with the routine work.

REPORT OF DIRECTOR OF BIOLOGICAL LABORATORY.

The following is the report of Dr. Richard P. Strong, director of the biological laboratory, for the period from September 1, 1904, to August 31, 1905:

The work of the biological laboratory for the past year may be conveniently considered under the following divisions: I, Clinical; II, pathological; III, hygienic; IV, entomological, and V, research. It has been pursued with the assistance of the following personnel: Dr. W. E. Musgrave and Mr. Moses T. Clegg (clinical laboratory), Dr. Maximilian Herzog (pathology), Dr. Wm. B. Wherry (bacteriology), Mr. Chas. S. Banks and Mr. William Schultze (entomology), Mr. Chas. B. Hare (hygienic laboratory work), Mr. F. A. Willyoung (curator of the museum), Mr. Joaquin Agustino (preparator of culture media), and Mr. T. Espinosa (artist). The laboratory also had as guests during the greater part of the year Drs. W. R. Brinckerhoff and E. E. Tyzzer, of Harvard University, who have pursued studies relative to variola and varicella. From November, 1904, to June, 1905, the superintendent of government laboratories was absent on leave, and it became necessary for the director of the biological laboratory to assume, in addition to his own, the duties of the superintendent. In June, 1905, Dr. Wm. B. Wherry, bacteriologist, having completed his two years' service in the laboratory, found it necessary to return to the United States and resigned his position as bacteriologist. The laboratory has much regretted the loss of his valuable services. Dr. Ralph T. Edwards, of Johns Hopkins University, was appointed bacteriologist and began his duties on May 31. On May 23, 1905, Dr. W. E. Musgrave was granted leave of absence for six months.

ROUTINE WORK.

Table I, which is appended, will give an idea of the character and number of the routine examinations which the laboratory has been called upon to perform for the Civil Hospital, Bilibid Prison, the board of health, the police surgeon, other government bureaus, and for private physicians, the total number during the year being 27,002. This total is somewhat less than that of the preceding year (30,830), but the latter period was characterized by an epidemic of surra in the city, which necessitated 9,569 examinations of animals for trypanosomiasis. During the present year, owing to the decreased amount of surra, the laboratory has been called upon to make only 2,823 examinations of this nature. Subtracting

from the figures for each year the number of examinations of animals for trypanosoma, we see that the other diagnostic work of the laboratory has increased from 21,261 examinations in 1904 to 24,178 in 1905. The great amount of time expended in the performance of these examinations must be obvious when one considers their character and number.

CLINICAL LABORATORY EXAMINATIONS.

Owing to the distance of the Civil Hospital and Bilibid Prison from the new laboratory buildings, it has been found entirely impracticable to send to the laboratory all specimens for examination, on account of the more or less perishable nature of some of them. For this reason the main laboratory has established small clinical laboratories in each of these institutions, and two of our staff have been detailed to perform the necessary work in them. The clinical determinations for other institutions and for private physicians have been made here.

A study of the statistical tables reveals some interesting points. Thus, Table III demonstrates that tuberculosis is a very prevalent disease among the 4,000 inmates of Bilibid Prison, and Table II also shows that many cases of uncinariasis exist among them. However, these infections with uncinaria in the prison are, as a rule, not extremely severe. A glance at some of the other tables (IV) also shows how uncommon are such diseases as malaria and typhoid fever in Manila, and how frequently amœbic dysentery (II) is encountered, particularly among foreigners. In several instances of anesthetic leprosy, in which the clinical diagnosis was extremely doubtful, the laboratory was called upon if possible to demonstrate the character of the disease. Excision and examination of a portion of the nerve in these cases has revealed leprosy bacilli, where they could not previously be demonstrated, in pieces of the skin and subcutaneous tissue. Of the rarer parasites (for Manila) encountered in the laboratory examinations may be noted *Opisthorchis sinensis*, *Balantidium coli*, and *Filaria nocturna*. Although I reported the first case with *Filaria nocturna* in the islands in 1901, since that time but few other instances of this infection have been met with. However, in this connection it is interesting to note that the mosquito *Culex fatigans*, which is supposed to act as the intermediate host, is very commonly encountered in Manila. Doctor Wherry's study of a recent case of infection with *Filaria nocturna* will be referred to below. Another case with *Balantidium coli* was discovered in a native of these islands, the patient succumbing to the infection. The pathological histology of this case will also be discussed later. The ova of *Opisthorchis sinensis* were found in a specimen of feces sent by Doctor Mallory, attending physician of the civil sanitarium at Baguio. Doctor Mallory will later report in detail upon this infection. This is the first time the parasite has been encountered in the Philippine Islands.

PATHOLOGICAL WORK.

The pathological work of the laboratory consists in the examination of tissues sent in for diagnosis and of necropsies performed for the board of health and other government institutions. The laboratory has at its disposal the autopsy material from Bilibid Prison, the Civil and the San Lázaro hospitals, the Hospital for Infectious Diseases, and the city dead. Owing to our great distance from these institutions and to the interval which often elapses between the death of a case and the hour at which the laboratory is notified much time is frequently lost. However, it is of much more serious import that the bodies are sometimes so badly decomposed before necropsy is performed upon them that accurate diagnoses are impossible. For this reason it is again urged that steps be taken toward the construction by the city of a central morgue in close proximity to the main laboratory, where all necropsies may be promptly executed.

During the recent outbreak of Asiatic cholera the value was again demonstrated of the diagnosis of cases at necropsy for the work of the board of health in order to assist them in the control of the disease, because it furnished information as a basis for quarantine and disinfection. Many of the patients were found dead by the sanitary inspectors. In a number of these instances a clinical diagnosis was impossible and a necropsy was required to determine the cause of death. The bacteriological diagnosis of the first fatal case of cholera was made in less than twenty-four hours by the following method: Plate cultures were prepared from the contents of the intestine, and as soon as colonies developed the morphology of the organism was determined and suspensions of the colonies in saline solution were tested with a standardized agglutinating cholera immune serum in the proper dilution. As soon as an agglutinative reaction was obtained the diagnosis was made. The other biological tests, such as the liquefaction of gelatin, the nitroso-indol reaction, and the pathogenicity for guinea pigs, were made merely for the purpose of confirming the diagnosis. After the outbreak had continued for some days the routine method employed for the bacteriological diagnosis consisted of three tests, namely, the morphology of the organism, the action of a cholera immune serum upon it, and its ability to give rise to the cholera red reaction upon the addition of nitrite-free sulphuric acid in the proper media.

Table V gives a general idea of the character of the necropsies performed during the year. An epidemic of lobar pneumonia, one of epidemic cerebro-spinal meningitis, and one of Asiatic cholera appeared in Bilibid prison. This table also shows that but one case of acute bacillary dysentery came to necropsy. This disease, which six years ago was a common one in Manila, to-day has become comparatively rare. Twenty-six cases of bubonic plague were encountered. The diagnosis of many of these was made only upon autopsy, the patients having been found dead in their houses and not having been seen by a board of health physician during life.

After the completion of the new laboratory building, the entire number of specimens comprising the pathological museum was carefully scrutinized, relabeled, and rearranged. The desirable ones were then placed in the new collection room, where they are protected from light. The museum contains many rare exhibits and will undoubtedly prove of very great value in connection with the teaching of pathological anatomy in the proposed government medical school. The recent epidemic of cholera has furnished us an opportunity to obtain fresh material representing the morbid anatomy in this disease.

Over 900 tissues have been hardened and embedded and 820 of these have been cut. About 4,100 microscopical sections have been mounted and stained. This work has been in charge of Mr. Frank H. Willyoung.

HYGIENIC WORK.

As in previous years, the work in this section has included the bacteriological analysis of many commercial waters bottled for sale, of a number of native mineral springs, and of the city water supply. In addition, many bacteriological analyses of milk and other foodstuffs and of disinfectants have been performed. During the recent epidemic of Asiatic cholera numerous samples of water and of foodstuffs have been examined for the cholera spirillum. There has been but little plague in the city during the year and therefore few rats have been sent in by the board of health for examination for *Bacillus pestis*. However, on one occasion one of these animals was found to be infected with this organism. The bacterium encountered was carefully identified by Dr. William B. Wherry and there was no doubt whatever that the rat succumbed to an infection with *Bacillus pestis*.

In May Dr. Maximilian Herzog was sent to Baguio, Benguet, for the purpose of making a bacteriological examination of the water supply of the summer capital and the civil sanitarium. Cases had occurred which it was supposed might have been bacillary dysentery and also several instances of typhoid fever had developed. Doctor Herzog was unable to isolate either *Bacillus typhosus*, *Bacillus dysenteriæ*, or *Bacillus coli* from the springs used for drinking purposes. However, in cultures from one of these he was able to isolate a species of amœba. The waters from the springs, from a chemical and bacteriological standpoint, were found, after careful study, to be very favorable ones for drinking purposes. Nevertheless, because a species of amœba was found in one of them, it was recommended that these waters be boiled for drinking.

In my report for the previous year I called attention to the attempts made by the city engineer to exclude amœba from the Manila city water supply by a system of filtration. These experiments all proved unsuccessful. Following the suggestion of Moore and Kellerman, of the Bureau of Plant Industry, Washington, on the employment of copper for the destruction of algæ and incidentally of bacteria in large bodies of water, and encouraged by the confirmatory work of the laboratories of the bureau of health of Philadelphia, recently published by Gildersleeve, Stewart, and Pennington, in regard to the action of colloidal solutions of copper on micro-organisms in water, the question of introducing copper sulphate into the reservoir of the Manila water supply was discussed. Finally, the city engineer decided to make this experiment and the laboratory was requested to perform counts of the number of micro-organisms per cubic centimeter just before, and at varying intervals after, the introduction of the copper sulphate. So far the chemical laboratory has reported the presence of copper at the tap in the laboratory in amounts of 1 to 5,000,000; but no diminution in the number of bacteria or amœba present has been noted within twelve days after the introduction of the copper. This substance was introduced on September 1. On this date there were 400 colonies of bacteria per cubic centimeter present. On September 2 there were 350 colonies per cubic centimeter, on September 6, 650, and September 12, 450. These variations are common in the water supply of Manila from day to day and are usually due to changes in the rainfall. The experiments are still being continued. Doctor Thomas of this laboratory has found by experimental work that amœbæ isolated from the city water supply and cultivated in symbiosis with the cholera spirillum were not destroyed when placed in copper crucibles for five days. He also found that high dilutions of cupric sulphate have practically no effect within ninety-six hours upon concentrated suspensions of amœbæ (8 cc. saline solution to one forty-eight hour slant agar culture of amœbæ).

RESEARCH.

Although but comparatively little of the time of the laboratory staff can be devoted to research work, a number of original investigations have been carried on. It is hoped, now that the government possesses a thoroughly equipped and modern laboratory, that the staff can soon be augmented so that at least some of the workers can be excused from the routine of the laboratory and be permitted to devote all of their time toward the investigation of some of the new and important problems in tropical medicine that still await solution. One most important position which has never been filled is that of zoologist, whose work especially should lie in the field of animal parasitology. Such a position will be absolutely essential when a division of animal industry is established by the government.

SMALLPOX.

During the past year the laboratory was fortunate in having as guests Drs. W. R. Brinckerhoff and E. E. Tyzzer, of Harvard University Medical School, who came to the islands under the direction of Professor Councilmann, of this same institution, to investigate certain problems in variola. The researches of these gentlemen will shortly appear as publications of the bureau. Their work has been of the highest value and has shed much light upon the general nature of smallpox and varicella and the immunity relations of vaccine and variola.

AMŒBIC DYSENTERY.

In October, 1904, the laboratory published the results of the valuable work of Dr. W. E. Musgrave and Mr. M. T. Clegg on the cultivation and etiologic significance of amœbæ and of Doctor Musgrave on the treatment of amœbiasis (amœbic dysentery) in the Tropics. These important papers were in press at the time of my last report and were discussed in it. Since their publication (bureau of government laboratories, biological laboratory, No. 18, October, 1904) they have attracted much attention, and the subject of the cultivation of amœbæ has received renewed stimulus both in the United States and in Europe. It is hoped that some definite work way be accomplished during the coming year on the differentiation, particularly from a zoological standpoint, of the amœbæ found in the stools of man and animals in the Philippine Islands. The extensive work of Schaudinn on the differentiation of the two forms *Entamœba hominis* and *Entamœba hystolitica*, which were encountered in the human intestine in Germany, needs careful confirmation in relation to the nonpathogenesis of the former species. There are, from the description which Schaudinn has given, obvious reasons for supposing that *Entamœba hystolitica* is the more harmful organism for man; but it seems that any classification into pathogenic and nonpathogenic amœbæ, based alone upon differences in the movements and character of the ectoplasm, should be accepted with caution. Before coming to any more definite conclusion about the relative pathogenicity of *Entamœba hystolitica* and *Entamœba hominis*, I believe that a more careful investigation should be made in relation to the secretory products of these parasites and a search be made for their enzymes and for any soluble or endotoxines which may be produced by them. Such a series of investigations has already been begun in this laboratory. Additional work is also being carried on in regard to the pure cultivation of these organisms by Mr. M. T. Clegg. The results of this class of work would be greatly expedited if a zoologist were part of the laboratory staff.

In relation to the pathology of amœbic dysentery, Doctors Musgrave and Woolley have recently examined our material, paying particular attention to the location and character of the lesions in the intestines. (Publication No. 32, bureau of government laboratories, biological laboratory, May, 1905.) Lesions were found in the ileum in 7 and in the appendix in 14 of our 200 fatal cases. The entire large bowel was found affected in 159. In some cases (23) the pathological process was limited. In these instances it occurred most commonly in the cæcum and ascending colon. A careful histological study of the intestinal tissues convinced the authors that amœbæ may enter the blood vessels very early in the disease and may be transported to the submucosa without lesions in the muscularis mucosæ.

A report has also been made by the director of the laboratory on intestinal hemorrhage as a fatal complication in amœbic dysentery and its association with liver abscess. (Publication No. 32, bureau of government laboratories, biological laboratory, May, 1905.) In 4 of of the Manila cases the patients succumbed to hemorrhage. Four others were collected from the literature, these also dying of this complication. In all of these 8 instances liver abscess coexisted. The connection between these multiple intestinal hemorrhages and such an hepatic condition has therefore suggested itself very strongly. Studies are now being undertaken on the coagulability of the blood (investigated by Wright's method) in cases of amœbic dysentery, for the purpose of ascertaining whether any changes occur, either during the course of the uncomplicated disease or in those cases in which liver abscess or hemorrhage develops. These studies may prove of considerable value in relation to the treatment of this malady and toward the prevention of this complication.

A study of the action of various chemical substances upon amœbæ in cultures has also been pursued in this laboratory by Dr. J. B. Thomas, formerly physician to the civil sanitarium at Baguio. (Publication No. 32, bureau of government laboratories, biological laboratory, May, 1905.) Doctor Thomas found that benzoyl acetyl peroxide, acid succinic peroxide 1-1,000, permanganate of potassium 1-2,000, sulphate of quinine 1-500, nitrate of silver 1-2,000, argyrol 1-500, and protargol 1-500 exercised a very marked effect on the growth of the amœbæ. Thymol 1-2,500 applied for fifteen minutes in some of the experiments destroyed the parasites.

BUBONIC PLAGUE.

Dr. Maximilian Herzog has occupied himself with the study of this disease throughout the year. In my last report attention was called to his investigaton, which was conducted with Mr. Charles B. Hare, on the subject of whether latent or dormant plague exists where the disease is endemic. This work led him to a negative decision of this question, and it was published in October, 1904. (Publication No. 20, bureau of government laboratories, biological laboratory, October, 1904.) In the same month Doctor Herzog's valuable studies on the bacteriology, morbid anatomy, and histopathology of this disease were issued from the laboratory. (Publication No. 23, bureau of government laboratories, biological laboratory, October, 1904.) This report will be found of great value to physicians who wish thoroughly to familiarize themselves with the morbid anatomy and histopathology of plague. In this disease a very important and interesting lesion, which occurs in the kidney, and which Doctor Herzog has called particular attention to, consists of extensive hyaline fibrin thromboses in the glomerular capillaries. In this study Doctor Herzog also has rightly emphasized the fact that plague in its most common bubonic type should not be looked upon as a true hemorrhagic septicæmia, because the infecting bacilli frequently remain localized until the agonal stage of the disease is reached.

GLANDERS.

A number of cases of human glanders have been encountered during the year, some of which were mistaken for smallpox, owing to the cutaneous lesions which existed. Attention has been called to this subject by Dr. William B. Wherry. (Publication No. 24, bureau of government laboratories, biological laboratory, November, 1904.) In this paper the diagnosis and prevention of the disease are discussed and a histological study, particularly of the lesions of the skin and lungs in the human cases of the disease, is detailed.

FILARIAL DISEASE.

A case of hæmatochyluria was carefully investigated during the year by Doctor Wherry, of this laboratory, and Dr. J. R. McDill, of Manila (Publication No. 31, bureau of government laboratories, biological laboratory, May, 1905), the case being a patient of Doctor McDill. The embryos of *Filaria nocturna* were found in the blood and in the milky, peach-colored urine. A study of the blood showed that the number of eosinophiles present varied between 6 per cent in the morning and 12 per cent at midnight. These cells were most numerous in the peripheral circulation at the time when the embryos occurred in the greatest numbers. Calvert, in his studies in Manila in 1902, found the opposite to be true in his case. A careful study of the morphology of the embryos has also been made and excellent photomicrographs secured.

TROPICAL ULCER.

For more than a year studies have been carried on with the view of ascertaining the etiology of the several varieties of boil or ulcer of tropical origin which occur in the Philippine Islands. During the year I encountered an interesting parasite in one of these in which the boil, in its clinical manifestations at least, answered very well to those of the Delhi type. The parasites met in the sections of this case are evidently not identical with the bodies previously described by J. Homer Wright in a case of tropical ulcer, nor do they appear to be the same as the so-called Leishman-Donovan bodies. However, they simulate somewhat in appearance the organisms encountered and described by Marchand and Leidingham in a case of splenomegaly. It is possible that if not identical they may be related to these bodies. The parasites found in the tissues in my case may be described as oval bodies, resembling cockleshells, with a sharp outline measuring about 4 "μ," in their greatest diameter. Many of these bodies contain particles of chromatin, which stain and which consist, first, of rounded masses, sometimes in the form of a ring, and, secondly, of a small dot or rod. These bodies are found both free and inclosed in large numbers in the endothelial phagocytes, or lie in a sort of matrix. In not all of the cockleshells are the chromatin masses present, and it is somewhat exceptional to see both particles in the same parasite. There can be no doubt as to the nature of the bodies encountered in my sections.

They are evidently forms of blastomyces (*torulæ*), though they are very different from the species encountered in certain human skin affections. It is probable that these parasites are identical in nature with those which are found in horses suffering with a similar form of tropical ulceration, and that the disease is occasionally transferred from these animals to man.

BALANTIDIUM COLI INFECTIONS.

Very recently another case of infection with *Balantidium coli* came into our hands. This was studied clinically by Dr. Maximilian Herzog and Mr. Charles B. Hare, of this laboratory. The latter pursued investigations relative to the cultivations of the parasite, but with negative results. Indeed, it soon died and rapidly became disintegrated in all artificial culture media into which it was introduced. The case finally died on the second day following the outbreak of cholera in Bilibid prison, in the hospital of which institution the patient had been confined. Owing to the excitement and press of work I was not informed of his death until about nine hours after it occurred. When I performed the necropsy most of the parasites were found upon microscopical examination to be already dead, though a few could be seen with feeble ciliary movements. The necropsy disclosed the fact that the patient had succumbed to subacute pericarditis. The large intestine showed numerous erosions and extensively undermined shallow ulcerations. Microscopical study of sections of these lesions showed numerous balantidia all through the mucosa, muscolaris, and submucosa. The parasites were also found in the muscular layer and in the blood vessels of the submucosa. Many of these were degenerated and had lost their nuclei. If the necropsy had been delayed much longer probably all would have become so disintegrated that none of them would have been recognizable in the tissues. There were erosions of the mucus membrane and extensive infiltration of the muscularis and submucosa existed. Apparently the *Balantidium coli* alone was productive of the intestinal lesions. A report form the laboratory was published in December (Publication No. 26, bureau of government laboratories, biological laboratory) considering in detail our first fatal case of this infection and discussing fully the clinical and pathological significance of this parasite.

ASIATIC CHOLERA.

In my last report reference was made to the work of Doctor Wherry on some observations on the biology of the cholera spirillum.

During the year he has continued these studies, particularly with reference to the nitrifying action of this organism in cultures, and has also studied the nitrate and nitrite contents of Witte's peptone, with special reference to its influence on the demonstration of the indol and cholera-red reactions. His studies have led him to conclude that the cholera spirillum is not a nitrifying organism and that the vermilion-colored, cholera-red reaction must be distinguished from the purple-colored indol one. He has also shown that nitrites, and probably also nitrates, may gain entrance to artificial media from various sources, such as certain waters, peptones, and filter papers, or that nitrites may even be absorbed in a few days from the laboratory atmosphere. The subject of protective inoculation in Asiatic cholera will be discussed under studies in immunity.

STUDIES IN IMMUNITY.

Shortly after the outbreak of Asiatic cholera in Bilibid prison it was decided to inoculate one-half of the inmates, which number about 4,000, with my prophylactic against this disease. The biological laboratory has performed these inoculations. This prophylactic, as mentioned in previous papers (Publication No. 16, bureau of government laboratories, biological laboratory, September, 1904), consists of a solution containing the free immunizing receptors of the cholera organism which are obtained by tryptic digestion and separation of the bacteria by filtration after they have been killed by heat. For the successful preparation of the prophylactic a strain of the organism possessing strong peptonizing powers and of maximum virulence is essential. The more virulent the cholera spirillum the greater is its immunizing power. A few changes have been made in the original method of preparation, but these need not be detailed here. During the last outbreak of Asiatic cholera the prophylactic has been prepared in large quantities by Doctor Ruediger, of the serum laboratory, and it has been standardized in the biological laboratory according to the number of units of immunity to which it gives rise. No prophylactic is considered potent unless 1 cc. furnishes 10,000 units of immunity upon intravenous injection into a rabbit. In the prophylactic probably the larger portion of the toxine exists in the form of toxoid, but 2 cc. must contain enough extracted intracellular toxine to produce, on intravenous injection in a rabbit, death in less than forty-eight hours. The advantages of our prophylactic over any other are that there is practically no local reaction after its use and that a

greater immunity can be obtained from it than by the inoculation of either living or killed cholera organisms. In the inoculations that have been carried on against this disease in India and Japan 2 mg. of the killed organisms have been injected subcutaneously. In our human inoculations the immunizing substances extracted from about 50 mg. of culture are injected into each individual; therefore a greater immunity is obtained. Both antitoxic, bactericidal, and agglutinative substances appear in the blood serum of the individuals who are inoculated, and their presence may be demonstrated five days after injection. However, the antitoxic value of the serum is slight. Researches are being pursued in the laboratory with the object of demonstrating that a highly bactericidal serum in the blood protects against intestinal infection by the cholera spirillum.

So far we have inoculated 1,804 of the inmates of the prison, and in not a single case has there been a suppuration, or, indeed, any noticeable local reaction. A number of physicians of the city have also been inoculated. To many of these the laboratory has demonstrated the immunity reactions of their blood serum. We do not believe that all the inhabitants of cities during epidemics should be inoculated against Asiatic cholera, since many individuals by careful living can avoid this disease; but it is recommended that all persons who by their mode of living are exposed to infection should receive this prophylactic.

On October 1 there was published a paper on Some Questions Relating to the Virulence of Microorganisms, with Particular Reference to their Immunizing Powers (Publication No. 21, bureau of government laboratories, biological laboratory, October, 1904), in which it was shown that the virulent cholera spirillum possessed a greater number of bacteriolytic and agglutinable haptophore groups, or these groups were endowed with a greater binding power for uniceptors and amboceptors than the avirulent ones, and that the bactericidal immunity obtained by means of the inoculation with the dead organisms of different virulence or their extracts (obtainted by autolytic digestion) was proportional to the virulence of the living strains of the bacteria employed. However, with the living organism, while the bactericidal immunity obtained in animals by inoculating with the virulent was greater than that produced with the avirulent, such immunity was not in direct proportion to the virulence of the bacteria introduced. From this research we have learned a point of considerable practical importance—namely, that in the preparation of our cholera prophylactic we must employ a strain of the organism of the highest obtainable virulence, since we know that the more virulent the spirillum the greater the amount of immunizing substances it contains. Practical work on immunity in bubonic plague in man is being carried on, and it is hoped that shortly some results of interest may be published.

ENTOMOLOGY.

The entomological work has been under the direction of Mr. Charles S. Banks, who has been assisted by Mr. Schultze. Mr. Banks has prepared the following report of the work accomplished in this division:

Laboratory work: The routine work in entomology has consisted (1) in the preparation of material for the cabinet, which includes alcoholic and pinned insects, microscopical slides of insects for study of their anatomy in connection with the work of classification, and biological series representing the stages of development of certain forms; (2) the rearing of those insects which it was found convenient to confine in the laboratory; (3) the identification and classification of the material in the collection, especially in the orders *Lepidoptera* (butterflies and moths), *Hymenoptera* (bees and wasps), and *Hemiptera* (bugs) [this work has been made possible by our having in the library most of the literature necessary for systematic work in these groups of insects]; (4) the identification of insects for other bureaus and for private individuals, together with the answering of inquiries with reference to injurious insects or to those the habits of which were not known; (5) the breeding of silkworms from eggs obtained from Japan, the results of which experiments will be published later; (6) the breeding of mosquitoes with the view of securing full notes of their life histories and habits; (7) the carrying on of a series of experiments in the influence of temperature upon color and markings in *Coleoptera* (beetles) and *Lepidoptera* (butterflies and moths), all of which will be published in the near future. Many rare and beautiful specimens of moths have been prepared, especially in the Microlepidoptera, but they have been stored until available boxes can be obtained.

RESEARCH.

The most important work during the year has been that carried on in connection with the rearing of silkworms (*Bombyx mori* L.). On my return to Manila from the United States in December, 1904, I spent a short time in Tokyo, Japan, where I had, through the kindness of Prof. S. I. Kuwana, entomologist of the imperial agricultural experiment station, a chance to witness some of the processes of silk culture as carried on in that country and to become familiar with the apparatus and general facilities which are necessary to successful silkworm raising. After my return to Manila, when I had found mulberry trees

growing here, I wrote to Professor Kuwana and through his kindness received some 15,000 eggs, prepared on cardboard in the Japanese manner. These began hatching the day of their arrival and grew well, so that in due course we obtained the cocoons, moths, and eggs for a second brood.

Work on cocoanut insects has been continued during the year, and a bulletin on the subject is now ready for the press.

The rhinoceros beetle (*Oryctes rhinoceros* L.) continues to be the most serious menace to the cocoanut industry in the islands, while nearly as injurious is the work of the Asiatic palm weevil (*Rhynchophorus ferrugineus* Fabr.). Both of these insects cause great losses every year, the natives being either ignorant of how to combat their depredations or, what is more probable, indifferent.

In February the chief of the bureau of agriculture made inquiries concerning insects attacking the squares, flowers, and bolls of cotton grown at the experimental station and supposed to be the cotton-boll weevil (*Anthonomus grandis* Boh.). I had previously observed this insect both here and in the island of Negros, on both native cotton and that from the United States. In speaking of native cotton I refer to certain plants of *Gossypium herbaceum* L. which, having been introduced in the past, have grown from year to year without special cultivation, and not to the plant called tree cotton (*Ceiba pentandra* Gaertn.) by the Filipinos. The insect found is not the Mexican boll weevil, but its habits and the damage which it causes merit thorough investigation, in order, if possible, to check the ravages.

Twice during the past year attempts have been made toward introducing honey bees (*Apis mellifera* L.) into the islands. Each time the bees were brought from Honolulu by Mr. Tracy, of the Manila post-office, and given to me. The first time the bees arrived in very bad condition, more than four-fifths having died in transit. The queen being dead this colony soon perished. The second attempt was more successful, in that fewer bees died, but a diligent search at the time of their arrival failed to reveal a queen or a single queen cell. This colony also gradually weakened and died. There is no doubt that honey bees would do very well here if the bringing of queens with the hive were positively assured, but in view of the comparative plenty of native honey of excellent quality and the cheapness of the Australian article it is doubtful if the enterprise of raising bees would be financially successful.

In this connection mention should be made of the great prevalence of the bee moth (*Galleria mellonella* L.) in the Philippines. This insect destroys the comb in hives under observation and has been found in those of the wild bees. It has been reared in the laboratory and its life period carefully noted; it would prove a serious menace to bee culture here.

The breeding of mosquitoes has been carried on with success during the year, and much has been learned about their life histories and habits. The fact that *Anopheles* has been found breeding in salt water in all the esteros and creeks of Manila and vicinity, where observations have been carried on, opens an interesting field for the investigation of pathologic conditions among the natives who live on the edges of the esteros and creeks, with a view to determining whether they are more subject to malaria than those living in other and less exposed localities.

In view of the fact that a very serious case of *myosis interna* was reported to this laboratory, specimens of the fly causing the trouble being identified as *Lucilia* sp., a visit was made to the principal markets of the city to note the possibility of flies laying their eggs upon the meats and fruits exposed for sale. While no eggs were found, the flies were always present in great numbers, and were walking freely over meats, vegetables, and sugar cane. As the latter is eaten raw by the natives, the chances are favorable for taking the eggs into the alimentary canal. The case reported to me was that of an American soldier, who had doubtless eaten half-raw meat or fruit of some kind bought in a *tienda* in the provincial town where he was located.[a] Dr. John M. Hewitt, U. S. Army surgeon, reported the case and presented the specimens to the laboratory collection.

COOPERATION.

This laboratory has had the most courteous cooperation from the following persons, to whom the thanks of the bureau are most cordially extended: Dr. L. O. Howard, chief, Bureau of Entomology, United States Department of Agriculture, Washington, D. C., in the determination of insects; Dr. W. H. Ashmead, assistant curator, United States National Museum, Washington, D. C., in the identification of *Hymenoptera;* Prof. S. I. Kuwana, entomologist, Imperial Japanese Agriculture Experiment Station, Tokyo, Japan, and Prof. S. Onuki and Dr. Y. Kozai, of the same institution, in connection with silkworm experiments and procuring of eggs; Prof. D. W. Coquillett, of the United States National Museum, Washington, D. C., in the identification of *Diptera;* Dr. E. P. Felt, State entomologist, Albany,

[a] A number of cases of this nature have previously been reported from the laboratory.

N. Y., in connection with work on mosquitoes; Hon. Dean C. Worcester, United States Philippine Commission, secretary of the interior, Manila, P. I., in presenting to the laboratory many hundred cocoons of *Attacus atlas* L., var. *lorquinii* Semper, for breeding experiments; Mr. Richard C. McGregor, bureau of government laboratories, Manila, P. I., in presenting to the laboratory several thousand of insects in all orders; Rev. Father Robert E. Brown, S. J., Manila observatory, Manila, P. I., in donating rare and valuable specimens in *Hymenoptera*, *Coleoptera*, and *Lepidoptera* to the collection; Rev. Father Fernando Sanchez, S. J., director of the Museum Ateneo de Manila, in connection with investigations of the history of silk culture in the Philippines; Dr. H. G. Dyar, custodian of *Lepidoptera*, United States National Museum, Washington, D. C., in identification of *Lepidoptera;* Mr. Warren Williamson, bureau of education, Quingan, Nueva Viscaya, P. I., in donating material for the collection; Mr. M. Fernandez Gerona, Tárlac; Mrs. Gustav Otto, Manila; Messrs. E. Celestino and M. Canton, Manila, in donating large numbers of very valuable insects, many of which were new to the collection; Mr. Primitivo Casajunco, Maragondong, Cavite, P. I., in lending valuable assistance in the investigation of native honey bees. Many other persons, both in the provinces and in Manila, have very materially aided the entomological work by donations.

A collection of insects, consisting of systematic, biologic, economic, and technical groups, was exhibited at the Louisiana Purchase Exposition, St. Louis, in 1904. The material was returned to Manila at the close of the exposition and placed again in the collection here.

ACCESSIONS.

The actual accessions of insects during the past year have nearly trebled those of the preceding one, and as each accession card represents all specimens of a species received at a given time from a given locality and person, the number of specimens received is far in excess of the number of accessions. It is estimated that the number of specimens added amounts to fully 10,000.

In certain orders, with the literature at hand, it has been possible to do much in classification. Mr. Schultze has directed considerable time to the determination of the *Lepidoptera*, about 80 per cent of the butterflies and moths, exclusive of the *Microlepidoptera* in the collection, having been determined. I have given such time as I could spare to the identification of the *Hymenoptera* and *Hemiptera*, but a very large percentage remains untouched. In identification of *Lepidoptera*, *Hymenoptera*, and *Diptera* we have been greatly aided by the gentlemen of the United States National Museum at Washington. Many supposed new species have been described in all orders, but their publication is deferred until it is possible to consult certain works which have been ordered.

In connection with Doctor Herzog's work on the transmission of plague by rat fleas, a new species, under the name *Pulex philippinensis*, was described by Mr. Schultze.

Doctor Ashmead,[a] of Washington, has recently described seven new species of Philippine *Hymenoptera* from material obtained from this laboratory.

Appended are the tables showing the number and character of the routine examinations performed by the laboratory:

TABLE I.—*Tabulated statement of laboratory examinations performed during the year.*

[Positive—Examinations showing organisms. Negative—Examinations showing absence of organisms.]

Character of examinations.	Civil hospital.			Bilibid prison.			Board of health.		
	Positive.	Negative.	Total.	Positive.	Negative.	Total.	Positive.	Negative.	Total.
Sputum, tubercle bacilli	37	107	144	293	1,891	2,184	4	27	31
Blood for—									
Malaria	44	260	304	6	19	25	.....	6	6
Filaria	.....	.....	.....	1	.....	1	.....	.....	.....
Counts	.....	.....	376	.....	.....	5	.....	.....	7
Serum reactions, B. typhosus	18	38	56	.....	.....	.....	3	2	5
Gonococci, pus for	15	54	69	1	.....	1	1,292	15,425	16,717
Feces	.....	.....	1,654	.....	.....	1,333	.....	.....	31
Waters, bacterial, etc	.....	.....	147	.....	.....	.....	.....	.....	304
Bacillus lepræ	1	2	3	2	11	13	3	5	8
Trypanosoma in animals	.....	.....	.....	.....	.....	.....	76	1,894	1,970
Liver abscess, amœbæ in	1	3	4	.....	.....	.....	.....	.....	.....
Appendix, for amœbæ	2	3	5	.....	.....	.....	.....	.....	.....
Rats, for plague	.....	.....	.....	.....	.....	.....	1	175	176
Total	118	467	2,762	303	1,921	3,562	1,379	17,534	19,265

[a] Proc. U. S. N. M., XXVIII: 957–971.

TABLE I.—*Tabulated statement of laboratory examinations performed during the year*—Con.

Character of examinations.	Police surgeon			Private physicians.			Other bureaus.			Total		
	Positive.	Negative.	Total	Positive.	Negative.	Total	Positive.	Negative.	Total.	Positive.	Negative.	Grand total.
Sputum, tubercle bacilli										334	2,025	2,359
Blood for—												
Hæmoglobin estimate									23			23
Malaria		2	2	5	6	11				55	293	348
Filaria				1	3	4				2	3	5
Counts						25						413
Serum reactions, B. typhosus										21	40	61
Gonococci, pus for	3	18	21		1	1				1,311	15,498	16,809
Feces			50			102						3,170
Waters, bacterial, etc									10			461
Bacillus lepræ										6	18	24
Necropsies												291
Trypanosoma in animals							6	847	853	82	2,741	2,823
Liver abscess, amœbæ in										1	3	4
Appendix, for amœbæ										2	3	5
Rats, for plague										1	175	176
Miscellaneous, for diagnosis												40
Total	3	20	73	6	10	143	6	847	886	1,815	20,799	27,002

TABLE II.—*Examinations of feces.*

Parasites.	Civil hospital		Bilibid prison		Board of health.		Police surgeon.		Private physicians.		Total		Grand total.
	Native.	Foreign.	Native.	Foreign.	Native.	Foreign.	Native.	Foreign.	Native.	Foreign.	Native.	Foreign.	
Amœbæ	30	417	200	6	6	2		17	1	27	237	469	706
Monads	14	321	169	5	8	5		9	1	26	192	366	558
Strongyloides intestinalis		21	2			1		3			2	25	27
Ova trichocephalous dispar	12	13	93					9	2	1	107	23	130
Ova uncinaria Duodenale	13	17	160		1			3		1	174	21	195
Ova ascaris lumbricoides	17	11	24		3	1		3	1		45	15	60
Ova oxyuris vermicularis		2										2	2
Opisthorchus sinensis									1		1		1
Balantidium Coli			2								2		2
Negatives	83	861	742	43	15	1	1	24	4	53	845	982	1,828
Total	142	1,512	1,275	58	24	7	1	49	7	95	1,449	1,721	3,170

TABLE III.—*Sputum examinations for tubercle bacilli.*

For whom examined.	Native.		Foreign.		Total.		Grand total.
	Positive.	Negative.	Positive.	Negative.	Positive.	Negative.	
Civil hospital	25	47	12	60	37	107	144
Bilibid prison	293	1,890		1	293	1,891	2,184
Board of health	2	24	2	3	4	27	31
Total	320	1,961	14	64	334	2,025	2,359

TABLE IV.—*Blood examinations.*

Character of examination.	Civil hospital.		Bilibid prison.		Board of health		[redacted] surgeon.		Private physicians.		Total.		Grand total.
	Native.	Foreign.	Native.	Foreign.	Native	Foreign.	Native.	Foreign.	Native.	Foreign.	Native.	Foreign.	
Erythrocytes	4	14				3				2	4	19	23
Leucocytes.													
Number	60	295	3	2	1	3				23	64	323	387
Differential		3										3	3
Malarial parasites.													
Tertian	6	14	5							3	11	17	28
Estivo-autumnal	13	8							1	1	14	9	23
Quartan	3		1								4		4
Negative for malaria	75	185	17	2	1	5		2	1	5	94	199	293
Serum reactions, B. typhosus:													
Positive	8	10			1	2					9	12	21
Negative	8	30				2					8	32	40
Filaria nocturna.													
Positive			1						1		2		2
Negative									3		3		3
Hæmoglobin estimate													29
Total													880

TABLE V.—*Necropsies.*

Tuberculosis of the lungs	33	Leprosy	2
Lobar pneumonia	32	General septicæmia	2
Asiatic cholera	31	Appendicitis, gangrenous	2
Amœbic dysentery	24	Acute bacillary dysentery	1
Plague:		Balantidium coli infection	1
Septicæmic	3	Smallpox	1
Pneumonic	3	Botulismus	1
Bubonic	20	Ptomaine poisoning	1
Cerebro-spinal meningitis	14	Tetanus	1
Beriberi	13	Miscellaneous	74
Enteritis (various forms)	13		
Malaria	6	Total	281

REPORT OF CHEMICAL LABORATORY.

The following is the report of the chemical laboratory, compiled by Dr. A. M. Clover, chief of the economic products division:

ROUTINE WORK.

The routine work of the chemical laboratory has much increased over that of the preceding year. That part of the work which may be classed as analytical is given below in the table of analyses, report being based upon the number of samples submitted, but very often the required analysis includes a quantitative determination of a dozen or more individual constituents, while on the other hand certain ones require only the detection, qualitatively, of one or two of the components of the product. Authorized requests for analyses from officials of the government have in every case been complied with, although in certain instances involving a large amount of work it has been customary to inquire into the purpose of the work, and very frequently it has been possible greatly to cut down the amount of work, with a saving of time and still to settle the questions involved. Analyses made by chemists in connection with investigations carried on in the chemical laboratory are not reported in the table, but authorized requests made by members of the other divisions of the bureau are reported.

The number of urine examinations during the past year has been less than that of the previous one, but is still large. As urine analyses generally take less time than any other class of chemical work, being to a certain extent comparable with bacteriological examinations, they should not be included in any comparative estimate of the results accomplished. Exclusive of the urine analyses the routine work of the past year shows an increase of 75 per cent over that of the previous one, and is nearly treble that of the year before.

The increase in the work performed is partly accounted for by the examination of 206 samples of native liquors submitted by the newly organized bureau of internal revenue, the

request being for the determination of the presence or absence of poisonous substances. Under the heading of foods and food stuffs is included the investigation of various articles of food with reference to their purity and the presence of adulterants or poisonous admixtures; the examination of crude products, such as cane for sugar, press cake for oil, etc.; analysis of milk to determine its purity and nutritive value; also of various animal feed stuffs, to determine their qualities. Under fertilizers are included guanos found in the islands, and also industrial or agricultural waste products which have a probable value for this purpose. Only a few soils have been analyzed during the year. A number of difficult rock analyses, as well as assays and coal determinations, were made for the mining bureau as part of its work of investigation of the mineral resources of the islands. The work required by the custom-house has been much greater than that of the preceding year, and the same may said of that performed for the insular purchasing agent.

As indicated in the table, the water analyses include: First, the complete mineral analyses of a number of waters obtained from important springs or artesian wells in different localities, to determine their suitability for drinking purposes or for their use in boilers; second, a less extensive analysis of a larger number, to ascertain their healthfulness as drinking waters. The laboratory cooperated with the board of health in an investigation into the effect of adding copper to the water supply of Manila in an attempt to purify the water. This investigation covered a period of ten weeks and necessitated the frequent examination of samples obtained from different sources. All of the records of the analyses of waters are, of course, preserved and have a permanent value.

The number of assays made, especially those for private persons, show a great increase over the previous year. The larger part of the samples have come from Masbate and Benguet. The samples generally yield good results in gold, but very little silver has as yet been found.

OTHER ROUTINE WORK.

In addition to work which may be classed as analytical, the laboratory has had a great variety of scientific questions propounded to it, to answer which much study and experimental investigation have generally been necessary. It has also been called upon to do other varieties of work because of the facilities at its disposal. This class of requests made upon the laboratory is by no means an unimportant one, and it has taken much of the time of those responsible for its conduct. (See Table VI.)

INVESTIGATION.

During the greater part of the past year the chemical staff has been barely able to keep up with the routine work required of it. At no time has it been possible to put any one man on a definite line of research with the expectation of allowing him to continue it uninterruptedly for a longer period than one month. Successful investigation can not be carried on unless the government is willing to employ additional men at salaries commensurate with the responsibilities of such work. The most important lines of investigation which have presented themselves are on the natural products of the islands. In order that work of this kind may lead to practical results it is absolutely necessary for a worker, in connection with his laboratory research, to do work in the field, in order that he may obtain correct information and reliable samples of material. During the year it has nearly always been impossible to spare any of the members of the laboratory staff because of the routine work. Several lines of work which have been pursued as far as possible under existing conditions are therefore waiting for further opportunities of this kind before completion.

COCOANUTS.

Mr. Walker has continued his work on this subject, paying special attention to questions relating to the best method of drying copra, to the best means of preparing high-grade oil for export, to the cause of rancidity in the oil, copra, and fresh meat, and to the measures to be taken to prevent deterioration. He has also analyzed many samples of nuts in the field to ascertain the yield of oil which can be depended on in different regions and from different trees, the influence of proximity to the seashore on the crop of nuts, and the soil factors entering into their successful production. He has also begun some study into the occurrence of fat-splitting enzymes in the germinating cocoanut. The results of this work will soon appear in a bulletin, the manuscript of which is already in the hands of the superintendent.

OILS.

The nuts and seeds of several trees and plants of the islands give good yields of oils, some of which have a local use for lighting or soap making. These have never been the subject of scientific study, and a good beginning has been made by Mr. Richmond toward

collecting data and samples and making a thorough study of their properties and possible uses, as well as of the press cake to be obtained. Chief among these are several varieties of "Lumban" or candle-nut oil which, when boiled, may be an efficient substitute for linseed.

ESTIMATION OF COPPER.

Mr. Fox has spent some time in perfecting an original method for the rapid estimation of copper in ores.

WOOD OILS, RESINS, ETC.

An investigation of these products has been carried on during the year. It has been necessary to depend upon the bureau of forestry for samples, a number of which have been submitted from different parts of Luzón. The solid resin copal (almaciga), widely distributed in subterranean beds throughout the islands, is a product of known value, and no work of a practical nature remains to be done upon it. A number of other solid resins, obtained from dipterocarpus trees (yacal, lauan), were found to be of value for varnishes, but a field study of these substances showed that their production would not be economically practicable. A thorough examination of three wood oils was made, and these may possibly prove of value. This work, in the form of a bulletin, is now in the hands of the printer.

PAPER

Mr. Richmond has begun an investigation of a number of Philippine plants for the purpose of ascertaining their availability for the purposes of paper manufacture. The materials available for paper making in these islands divide themselves into four classes—grasses, palms, wastes from fiber-producing plants, and woods. In the first class the cogon grass, which grows so abundantly in all nonwooded, uncultivated areas in the Philippines, sometimes reaching a height of 10 to 12 feet, is the most important, and it readily yields to treatment, producing a very satisfactory grade of pulp. Bamboo and caña bojo, a species of dwarf bamboo, have also been examined, with very good results. Among the palms, the buri palm (*Corypha umbraculifera*) has been the subject of study. While the stems of its leaves, which are 16 to 20 feet long and very heavy, are more resistant than the grasses, still the ultimate fiber is of good length and the quality of pulp very encouraging. The waste from the abacá (Philippine hemp) have also been investigated, and the result shows that this product, formerly of no value, has a very decided field in the manufacture of good qualities of paper. The same may be said of the maguey or sisal. The woods have not as yet been examined. The laboratory has ordered a model beater and apparatus for cooking the raw material under pressure, and the intention is to prepare hand-made paper from the various materials, so that samples can be submitted with the published bulletin. A considerable amount of work has also been done in collecting data as to the available supply of raw materials, the best areas for cogon paper making, the cost of transportation and chemicals, so that complete data will be on hand when the work is published.

TABLE VI.—*Analyses performed in the chemical laboratory.*

	Alcohols.	Alcoholic beverages.	Assays.	Cements.	Coals.	Foods and feeding stuffs.	Fertilizers.	Metals and alloys.	Medicines.	Minerals.	Oils.
Bureau of agriculture						12					
Civil hospital						1			4		
Custom-house		5				24		33	1		11
Bureau of forestry											
Bureau of government laboratories									1		
Bureau of engineering				13	1					2	
Bureau of internal revenue	1	268									
Insular purchasing agent	15			1	1			7	1		39
Bureau of mining			30		32			1		19	
Bureau of public health		7				1			3		
Other government offices and institutions						1	3	9			2
Police department city of Manila											
Private		1	150	2	13	20	1	5		4	5
Total	16	281	180	16	47	59	11	55	9	25	57

TABLE VI.—*Analyses performed in the chemical laboratory*—Continued.

	Paints, colors, varnishes, etc.	Physiological (not classed elsewhere).	Toxicological	Soils	Urines.	Waters (mineral analyses)	Waters (sanitary analyses)	Miscellaneous.	Total.
Bureau of agriculture				5				2	26
Civil hospital		14			470				489
Custom-house	227							8	309
Bureau of forestry				8				1	9
Bureau of government laboratories			4					6	11
Bureau of engineering						3	3		22
Bureau of internal revenue								6	275
Insular purchasing agent	6							1	71
Bureau of mining									62
Bureau of public health		6	10		20	1	33		80
Other government offices and institutions			2	1		9	8	3	35
Police department, city of Manila					12				12
Private	8	1	2		49	6	1	3	277
Total	241	21	18	14	551	18	45	30	1,696

REPORT OF SERUM LABORATORY.

The following is the report of Dr. Paul G. Woolley, director of the serum laboratory for the period from September 1, 1904, to August 31, 1905.

During the year the work of the serum laboratory has in general been continued along the lines followed by Doctor Jobling in the past, but in addition to the continuation of vaccine, rinderpest, mallein, and plague prophylactic, other products were added to the list, and still others are in process of preparation. Among these are diphtheria antitoxin, antiplague, antithyroid (*Antithyroidin-Moebius*) serums, and cholera vaccine. Tetanus antitoxin will be available in a few months. Some attention was also given to antityphoid serum, but just as we were hoping to test its value the animal which was being used for the purpose died. We hope that during the coming year we may have sufficient time and assistance to add antidysenteric serum and tuberculin to the list. At the present time antirinderpest serum, vaccine virus, plague prophylactic (Shiga and Haffkine), plague serum, mallein, diphtheria antitoxin, and antithyroidin are available.

Several experiments were made with desiccated antirinderpest serum, following the method advocated by Dschunkowsky and Kupzis.[a] In order to prevent the dried product from sticking to the dishes, 0.2 per cent sodium hydroxide was added to the serum, which was then poured out in shallow glass dishes, and these in time were set in an incubator at 35° C. The desiccation proceeded rapidly and the product consisted of thin, clear, amber-colored flakes, which were ground up and then formed a fine, yellowish powder. According to the above-mentioned writers, this powder should readily be soluble in salt solution, but in our experience it was not sufficiently so for field use. This led us to conclude that the dried serum was not practically valuable.

During the months of July and August, 1905, the director visited the institute for infectious diseases, serum institute and lymph institute of the Imperial Government of Japan, in Tokyo, in order to observe the methods employed in those institutions. Through the kindness of Doctor Kitasato, he was able to make careful investigations for a period covering more than three weeks. The notes referring to the observations have been embodied in a special report to the superintendent of government laboratories.

At various times during the year we have had occasion to ask favors of Doctor Kitasato, of the Imperial laboratories at Tokyo, Japan, and in each instance the response has been immediate and our requests fully complied with. Our grateful thanks are due to Doctor Kitasato and his assistants.

The preparation of sera, except antirinderpest serum, has been in charge of Dr. E. H. Ruediger, bacteriologist of the laboratory, and it is to his conscientious efficiency that the possibility of enlarging the work of the laboratory in a large part is due.

Doctor Sorrell has been, as heretofore, in charge of the rinderpest work and has, in spite of many obstacles, done his part of the work thoroughly and well. He has had some assistance from other veterinarians and inoculators, who have been detailed from

[a] Centrf Bakt. 1904, XXXVI, 91.

the board of health to the serum laboratory for instruction before being sent into the provinces.

The preparation of vaccine virus has been in charge of Mr. Cheek, and the results he has obtained during the past year have been exceptional. Never, so far as we have been able to discover, has the yield of pulp per animal been so great (see Table V), and at the same time the activity of the vaccine has been kept at its maximum. The method of preparation of vaccine virus has been described in a small illustrated pamphlet issued by the bureau of government laboratories.

In the care of Mr. Bean the guinea pig and rabbit colony has prospered better than we could have expected from past experiences; but even at the best these animals do not live as well as they do in colder climates, and especially during the wet season the death rate is very high. However, we have been able to furnish enough animals for the necessary experimental work of the bureau.

An attempt was made to produce enough chickens and pigeons for the use of the bureau in its bacteriological work. For some time both of these species prospered, but later chicken cholera appeared and destroyed most of the chickens and many of the pigeons. The epidemic seemed to originate from the pigeon house, near which the first chickens were found dead. It is probable that the pigeons in their wanderings acquired the disease and introduced it.

The work of the laboratory has been pleasanter and more easy of accomplishment since the transfer of all but the rinderpest work to the new building in calle Herrán. Here each man has a workroom of his own, and well-ventilated stables with operating rooms are near at hand. At present the old laboratory at San Lázaro is devoted exclusively to the rinderpest work and to the breeding colonies for small animals.

Previously, during the rainy seasons, the grounds at the San Lázaro corral were practically a large swamp. To better the unpleasant conditions all the stables have been repaired, the old floors have been replaced by new 2-inch wood, and cement drains have been built about the stables and watering troughs. The spaces between the stables have been paved with stone, and all the space about has been filled with sand, and graded. This latter part of the work has been done by the laborers at the laboratory, and all the hauling has been done by the cattle of the serum herd. At the present time the water for the stables is drained away through a covered cement drain. Besides this work, 56 new stalls have been built. One of the most valuable improvements is a dust and insect proof room in the main building at San Lázaro. In this place the serum is prepared, and after each workday the room is scrubbed with an antiseptic solution, and formalin vapor is allowed to remain therein until the space is once more needed.

A portion of the serum animals have been used as draft animals during the year, not only at San Lázaro but also at the premises on calle Herrán. In this capacity they have proved their value, being fully as satisfactory as carabaos. The work done by them has undoubtedly saved the government considerable expense.

The prevalence of rinderpest in the islands and the increase in the personnel of the veterinary corps of the board of health necessitated increasing the size of the serum herd in order to meet the demands made upon the laboratory. So much serum has been used, and so rapidly and with such success, that it has been very difficult at times to obtain a sufficient amount of virulent blood to keep up the serum production. During the past two months a supply of nonimmune animals has been obtained from the island of Sibuyan, and as long as this lasts, unless some unexpected disaster happens, practically no difficulty will be experienced in supplying enough serum.

During the year, in spite of the press of routine work, time has been found for a certain amount of research. Doctor Ruediger has made some studies upon pseudo-diphtheria, in connection with his work on true diphtheria. The director, with Doctor Sorrell, has completed a clinical, bacteriologic and pathologic study of broncho-pneumonia in cattle and calves, the results of which have been published in Bulletin No. 20. Besides this the director has made reports on Pinto (Bulletin No. 20) Framboesa (Bulletin No. 20); with Doctor Musgrave he has also prepared a pathologic report on intestinal amœbiasis (Bulletin No. 32).

Acting upon the suggestion of Doctor Musgrave, who desired to try the serum treatment for exopthalmic goitre, a sheep was subjected to the operation of thyroidectomy and after two weeks was bled, and the serum collected. To this serum, carbolic acid was added in a proportion of 0.5 per cent and administered to the patient by mouth, in 1 cc. doses twice a day. Subsequently the dose was increased to 2 cc. and later again, after the sheep was becoming weak and showing the effects of the absence of the glands, it was bled to death and a dose of 1 cc. instituted. The effects thus far have been good, the pulse has slowed and the general condition of the patient has improved. This experimental work will in the near future form the basis of report by Doctor Musgrave and the director.

On several occasions chickens suffering from a disease confined to the comb, wattles, corners of the mouth, and the eyelids have been brought to the laboratory to obtain a diagnosis. Microscopic examination of the affected tissues has shown the presence of a fungus similar to that causing *Fowl favus*. The condition in an early stage can be ameliorated by painting a one-half per cent solution of silver nitrate upon the diseased parts. The disease is a widespread one, and evidently goes *pari passu* with the ringworm of calves and "dhobie itch" of human beings, both of which are primarily caused by a trichophyton. Tinea of rabbits has also been observed at the laboratory by Mr. Bean, and this has been cured by careful washing with creolin solutions.

No trouble has resulted this year from surra. Frequent examinations of the blood of every calf, horse, and bullock in the laboratory stables and corral have been made, but in no case have any trypanosomas been found. Texas fever has not occurred in any well animals. In a few instances pyrosomas have been found in animals sick with rinderpest, but in such cases the disease has undoubtedly been the result of the rinderpest, which by lowering the resistance of the animals, predisposed to a recrudescence of Texas fever.

In many of the autopsies upon cattle and calves, hepatic and intestinal parasites, which we were unable to identify, chiefly because of the lack of literature relating to this subject, have been found. In such cases the organisms have been preserved and sent to Dr. Charles Wardell Stiles at the Hygienic Laboratory in Washington, D. C. The following information has been very kindly forwarded to us by Doctor Stiles. The numbers refer to the places the specimens occupy in Doctor Stiles's collection.

9576. *Filaria labiatopapillosa* (from a Hongkong calf).
9577. A new species of *Hæmonchus* (from a Hongkong calf).
9578–79. *Fasciola* (?) (from a Hongkong calf).
9580–81. *Homalogaster poirieri* (?) (from Hongkong calves).
9582. *Oesophagostoma* (?) (from a horse).

Regarding these, Doctor Stiles says in a letter: "Referring to specimens 9578–79, these are true members of the genus *Fasciola*. They differ from the two species which we have in this country, namely, *F. hepatica* and *F. americana*. They resemble in some respects *F. gigantea* which occurs in Africa."

Referring to specimens 9580–81, "I find that they agree more closely with *Homalogaster poirieri* than with any other parasite known. There are however certain characters which do not agree with the original description of this form, and on that account I suspect that this form is a new species."

ANTIRINDERPEST SERUM.

In a goat, the *Oesophogostonum columbianum* was found and it had produced a condition of the intestine which might be called *Esophegostomiasis nodularis*.

Doctor Sorrell has continued to use the method introduced by Doctor Jobling. Under his supervision animals at the laboratory have been kept in the most excellent condition and the output of serum has been largely increased.

While it is true that the expense attached to the production of antirinderpest is large, it has been possible during the past year, as in previous ones, to reduce this by sales and exchanges of animals to local cattle dealers. This cost to the laboratories has further been diminished by our being able to obtain some cattle from the insular purchasing agent on memorandum receipt. The animals introduced into the herd in this manner were inoculated and bled, and when finished were returned to the bureau to which they belonged. The insular purchasing agent was reimbursed from the laboratory appropriations for all those which died.

TABLE VII.—*Number of cattle purchased, exchanged, sold, and which died or were bled to death in producing virulent blood.*

Month.	Received by purchase.	Received on memorandum receipt from insular purchasing agent.	Returned by other bureaus.	Received in exchange.	Died.	Sold.	Transferred.	Delivered in exchange.	Returned to insular purchasing agent.
1904.									
September	19	.....	5	3	11	.....	.....	13	.....
October	10	.....	.....	25	19	.....	.....	5	.....
November	.....	.....	1	12	14	.....	2	19	.....
December	20	.....	12	18	18	.....	.....	.....	.....
1905.									
January	.....	.....	.....	10	13	.....	.....	11	.....
February	1	.....	.....	.....	2	.....	.....	.....	.....
March	15	.....	.....	.....	19	.....	.....	7	.....
April	.....	.....	.....	.....	5	15	.....	3	.....
May	26	.....	.....	6	19	.....	.....	6	.....
June	.....	.....	.....	4	9	.....	14	4	.....
July	19	50	.....	1	10	.....	.....	1	6
August	15	.....	.....	.....	30	.....	.....	.....	.....
Total	125	50	18	79	169	15	16	69	6

On hand September 1, 1904 108
Due in exchange 10
On hand August 31, 1905 115

Cause of death: Rinderpest and rinderpest and foot and mouth disease combined, death occurring shortly after arrival and previous to inoculation, 16; deaths from inoculations, 0; bled to death for virulent blood, 117; due to other causes, 36; total, 169.

TABLE VIII.—*Amount of serum prepared, issued, used at the laboratory, returned, destroyed because of inertness.*

[Amount in cubic centimeters.]

Month.	Prepared.	Issued.	Used at laboratory.	Returned.	Destroyed.
1904.					
September	107,400	94,400	26,600	13,035	.....
October	91,300	60,000	19,200	6,900	16,500
November	131,100	50,400	5,300	.....	.....
December	142,800	112,500	3,750	.....	.....
1905.					
January	159,500	252,000	5,600	.....	.....
February	96,600	129,600	4,200	.....	.....
March	92,250	64,200	7,300	36,900	.....
April	57,300	70,500	1,300	.....	.....
May	23,100	1,500	3,300	.....	[a] 36,000
June	80,250	80,700	4,150	.....	.....
July	112,500	125,400	5,950	.....	.....
August	112,850	110,900	5,600	.....	.....
Total	1,206,950	1,152,100	[b] 92,250	56,835	52,500

On hand August 31, 1904 33,065
On hand August 31, 1905 0

[a] Returned in March, 1905, from the board of health. The serum destroyed in each instance represents serum that was issued to the board of health and which was returned after varying periods of time unused. The changing physical conditions to which it was subjected accounts for its inertness.

[b] Of this amount, 31,500 cubic centimeters were used at San Juan del Monte for inoculating a herd of animals imported by the bureau of agriculture

TABLE IX.—*Number of inoculations at the laboratory and the amount of serum and blood used.*

Month.	Inoculated with serum	Serum used, cc.	Inoculated with blood.	Blood used, cc.
1904.				
September	5	500	181	69,670
October	27	3,200	.....	.....
November	7	1,000	.....	.....
December	25	2,750	128	128,560
1905.				
January	5	350	73	84,310
February	2	150	13	9,200
March	2	500	83	115,400
April	.....	.....	.....	.....
May	9	900	59	89,200
June	.....	.....	30	33,000
July	50	2,500	54	43,060
August	.....	.....	177	107,350
Total	132	11,850	798	679,750

VACCINE VIRUS.

The method of preparing vaccine virus has been described in a pamphlet prepared by the director.

Since the discontinuance of the shipments of carabaos from Shanghai no carabao calves have been obtained, but in spite of this fact the production has been kept up and the supply has always been more than equal to the demand. The success that we have had at the laboratory and the reports from the practitioners of Manila, as well as those from the board of health, the Army, and the Public Health and Marine-Hospital Service, speak for the efficacy of the vaccine prepared by the serum laboratory. The fact that high temperature impairs the value of this material makes especial care necessary if it must be preserved for any length of time.

It is interesting, in referring to Table V, to compare our results with those cited by Dock.[a] He says: "By the present method one calf will furnish from several hundred to several thousand portions of vaccine, three or four thousand being not unusual, and perfect vaccination has been obtained from calves giving as much as 15,000 portions." In our experience one calf produced 108 grams of pulp, equivalent, after diluting with 60 per cent glycerin in the ratio of one-fourth, to 432 centimeters of vaccine. If one cubic centimeter will vaccinate fifty persons the vaccine from this single calf would be sufficient for 21,600 vaccinations. In the same way the pulp from the steer producing 170 grams would suffice for 34,000 vaccinations. The vaccine from both these animals was perfectly active.

TABLE X.—*Number of calves purchased, exchanged, sold, and died.*

Month.	Purchase.	Exchanged.	Sold.	Died.	Born on premises.
1904.					
September	5	34	15	8	.....
October	3	20	.....	20	.....
November	25	18	.....	3	.....
December	10	.....	.....	1	.....
1905.					
January	11	14	.....	13	.....
February	15	.....	9	10	.....
March	39	6	7	7	.....
April	.....	.....	1	14	.....
May	16	14	.....	.....	.....
June	.....	.....	4	6	.....
July	.....	.....	2	3	.....
August	.....	.....	19	11	1
Total	124	106	57	[b] 96	1

On hand September 1, 1904..... 54
On hand August 31, 1905..... 26

[a] J. H. H., 1904, XV, 112.

[b] Cause of death: Natural infection, many calves reaching the islands being infected on arrival, 70; rinderpest inoculation, 4; bled for virulent blood, 1; other causes, 21; total, 96.

TABLE XI.—*Number of calves vaccinated, collected from, the amounts of pulp collected (grams), and the average yield per head.*

Month.	Vaccinated.	Collected from.	Amount of pulp.	Average per head.	Maximum yield per head.
1904.					
September	29	16	540	33.75	94
October	15	15	377	25.1	48
November	23	21	426	20	45
December	25	22	527	23.9	60
1905.					
January	15	15	282	18	40
February	9	7	97	13.8	30
March	[a] 9	8	449	56.1	[a] 108
April	4	2	56	28	32
May	16	15	685	45.4	83
June	15	15	768	51.1	128
July	8	8	379	47.3	80
August	16	12	456	38	80
Total	184	156	5,042	.....	.....

[a] In addition to these 9 calves 4 steers were vaccinated and these 4 animals produced 409 grams of pulp, an average of 102.25 grams per head. One of these cattle produced 170 grams.

TABLE XII.—*Amount of vaccine virus prepared, issued, destroyed, and used at the laboratory.*

Month.	Prepared.	Issued.	Destroyed.	Used at laboratory.
1904.				
September	300,000	213,000	180,000	.....
October	120,000	249,750	.....	.....
November	140,000	180,100	.....	.....
December	130,000	251,250	130,000	.....
1905.				
January	230,000	188,035	.....	.....
February	145,000	238,400	.....	.....
March	1,220,000	567,600	.....	35,000
April	22,000	367,500	.....	.....
May	455,000	234,800	.....	.....
June	352,000	271,185	.....	25,000
July	121,300	245,630	.....	.....
August	340,750	228,993	.....	.....
Total	3,576,050	3,196,243	310,000	60,000
Withdrawn as not ready for distribution	551,170	.....	.....	.....
Total	3,024,880	.....	.....	.....

On hand September 1, 1904 656,740
On hand August 31, 1905 115,377

There was also prepared and used at the laboratory 90,000 units vaccine seed.

Cost of preparing antirinderpest serum.

Salaries	₱17,220.00
Cost of cattle	9,416.50
Cost of feed	18,327.00
Cost of supplies	5,582.96
Value of serum used	197.50
Interest, repairs, and depreciation	2,500.00
	53,243.96
Less sale of cattle	1,350.00
	51,893.96
Rinderpest serum prepared, 1,206,950 cc.	
Cost, at ₱12.90 per bottle of 300 cc.; number of bottles, 4,023	51,893.96
Value, at ₱15 per bottle containing 300 cc	60,343.00

In 1905 106 animals were used for virulent blood; other animals were purchased for serum work. Under the present arrangements serum animals cost us nothing, and virulent blood animals ₱55 per head. Under these conditions a difference of ₱0.38 per bottle of 300 cc. would result, and the cost price would amount to ₱12.52, and the cost price of 1,206,950 cc. would amount to ₱50,367.96.

Undoubtedly, under the present arrangements, more serum can be produced and the cost further reduced.

There were inoculated by the "simultaneous method" at this laboratory 85 animals, with no deaths.

Cost of preparing vaccine virus.

Salaries	₱5,426.33
Cost of calves	4,198.00
Cost of feed	3,134.82
Cost of supplies	3,721.97
Value of antirinderpest serum used in immunizing	2,445.00
Value of veccine and vaccine seed used, 150,000 units	4,500.00
Interest, repairs, and depreciation	1,000.00
	24,426.12
Less sale of calves	1,581.00
	22,845.12
Vaccine prepared, 3,114,800 doses.	
Cost, at ₱0.00733	22,845.12
Value of total vaccine prepared, at ₱0.03	93,444.00
Value (Japan price), at ₱0.06	186,888.00
This quantity could be obtained in the United States at ₱0.14	436,072.00

Vaccine will deteriorate rapidly if not kept under the best conditions. In shipping, time and vaccine are both lost.

According to the Japanese, winter vaccine will keep well in the cold for six months, but summer vaccine can not be preserved under the same conditions for more than three months. Philippine vaccine is summer vaccine.

According to Doctors Brinckerhoff and Tyzzer, Philippine vaccine is as efficient as any which they have studied.

DIPHTHERIA ANTITOXIN.

During the year one horse has been immunized against diphtheria to such a degree of resistance that at the time of the first bleeding the serum had an antitoxic value of 300 units per cubic centimeter. At present this value has increased to 350. Amount prepared, 50,000 units.

ANTIPLAGUE SERUM.

More than a year ago immunization of horses for the preparation of plague serum was commenced, and because of the danger in using living cultures, not only to the workers in the stables, but also to the horses, nothing but dead cultures in the form of Haffkeine's prophylactic have been used. In this way four horses have been immunized to such a degree that injections of 1,000 cc. can be given. Amount prepared, 960 cc.

CHOLERA VACCINE.

The making of this material was begun in August, and during that month 180 cc. were completed. The work is still in progress, and the supply will be largely increased, so that wholesale inoculations may be made. This vaccine is prepared according to the directions of Doctor Strong. [a]

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[a] See Bulletin, bureau of government laboratories, No. 16.

TABLE XIII.—*Plague prophylactic.*

[Cubic centimeters.]

Month.	Prepared.	Issued to board of health.	Destroyed.
1904.			
September	3,000		
October			
November	3,000		
December			
1905.			
January			
February		1,296	
March			
April			
May			
June			700
July			
August			
Total	6,000	1,296	700

	Cubic centimeters.
On hand August 31, 1904	11,536
On hand August 31, 1905	15,540

Cost, at ₱0.015 per cc., 6,000 cc., ₱90.

TABLE XIV.—*Mallein, number of doses.*

Month.	Prepared.	Issued to board of health.	Issued to property clerk.	Destroyed.
1904.				
September	1,800	150	262	
October				
November			25	
December	162	6		
1905.				
January				
February		25		
March	280	5		
April				
May			280	368
June			25	
July				
August		100	20	
Total	2,242	286	612	368

	Doses.
On hand August 31, 1904	320
On hand August 31, 1905	1,296

Cost, at ₱0.03, 2,242 doses, ₱67.26.

REPORT OF BOTANIST.

The following is the report of Mr. Elmer D. Merrill, botanist, covering the botanical work of the bureau from September 1, 1904, to August 31, 1905:

The general policy in regard to botanical work, followed for the past three years, has been continued, with the result that it is well established, and the laboratory not only is well equipped to continue investigations along lines already started, but also to develop other fields of investigation, notably those of an economic and technical nature. As the library is enlarged and the herbarium and other equipment increased in size and value, we shall correspondingly be able more thoroughly to investigate problems regarding the Philippine flora.

The herbarium work in the past has been given the greater prominence, in order to increase the collections in Philippine and extra-Philippine material as rapidly as possible and to enhance its value as a reference collection, it being not only a primary essential in

this country to all scientific investigations on the Philippine flora, but also equally essential to a better knowledge of the economic botany of the archipelago. This is especially true in regard to investigations undertaken by other employees of this bureau on the fiber plants, oils, resins, gums, medicinal plants, dyes, tannins, etc., as well as to various problems relating to the development of forestry and agriculture. The herbarium has almost doubled in the past twelve months.

PERSONNEL.

Some changes have been made in the personnel of the botanical laboratory during the past year. On July 11, 1905, Dr. E. B. Copeland, systematic botanist, was transferred to the bureau of education, and was given charge of instruction in botany in the Philippine normal school, Manila, and general supervision over botanical work in the provincial high schools. He will continue botanical work on the classification of the cellular and vascular cryptogams in this bureau, and he makes constant use of our herbarium and library in connection with his duties in the bureau of education. Dr. H. N. Whitford, botanical collector, was promoted to the position made vacant by Doctor Copeland on July 12, 1905. On May 31, 1905, on account of continued ill health, Eugenio Fenix was obliged to resign. Mr. Fenix had charge of the preparation and mounting of herbarium material and the general routine herbarium work. For nearly two years he has had charge of this class of work, and has evinced marked aptitude and interest for it. The loss of his services is greatly to be regretted.

HERBARIUM.

The growth of the herbarium during the past year has been very gratifying, although the financial condition of the bureau has not been entirely favorable to extensive botanical exploration of the more interesting regions of the archipelago. In many groups our material is now sufficient to allow us to begin monographic work on various families with the assurance that we can make such work fairly complete so far as the Philippine flora is concerned. At the close of the last year the herbarium contained 10,989 mounted sheets, and this number has been increased to 20,733 during the past twelve months. The preliminary identifications have been made and the material poisoned, mounted, and distributed in families and genera, so as to be available for future reference and study. The 9,744 specimens added in the past year have been received from the following sources:

Foreign.

Royal Botanic Garden, Calcutta, India; Indian and Malayan plants	630
Botanical Garden, Singapore; Malayan plants	341
Botanic Garden, Sidney, New South Wales; Australian plants	1,289
Botanic Garden, Hongkong; Hongkong and Chinese plants	316
Herbier Boissier, Chambésy, Switzerland; European plants	887
Total	3,463

In addition to the above, 880 specimens of Cuming's Philippine collection were received from the British Museum. These are enumerated below:

Philippine.

Collection of Elmer D. Merrill, provinces of Bataán, Tayabas, Cavite, and Pampanga, Luzón, and islands of Mindoro, Banton, Tablas, and Semerara	346
Collection of E. B. Copeland, Mindanao	379
Collection of H. N. Whitford, provinces of Tayabas, and Bataán, Luzón	703
Collection of A. D. E. Elmer, province of Bataán, Luzón	295

COLLECTION OF THE FORESTRY BUREAU.

W. M. Maule, province of Zambales, Luzón	21
P. T. Barnes, province of Benguet, Luzón	61
W. W. Clark, Islands of Masbate, Ticao, and Burias	132
Mariano Ramos, provinces of Rizal and Bataán	630
T. E. Borden, province of Bataán, Luzón	1,013
E. Hagger, province of Tayabas, Luzón	35
W. Klemme, province of Tayabas, Luzón	11
R. Meyer, province of Bataán, Luzón	435
Total	2,338

Collection of Hugh Cuming, Philippines, 1836–1840, received from the Botanical Department, British Museum	880
José Muñoz, Negros	13
Merrill, Decades Philippine Forest Flora	300
Dr. V. B. Gregory, Atimonan, Tayabas	128
R. C. McGregor, Islands of Sibuyan, Semerara, and Mindoro	409
Doctor Pond, Baguio, Benguet	35
D. LeRoy Topping, provinces of Bataán, Pampanga, and Laguna, Luzón	186
Arthur E. Yoder, Panay	19
F. H. Bolster, provinces of Pampanga and Cagayán, Luzón	133
C. S. Banks, Canlaon Volcano, Negros	16
Fortunato Alberto, Manila, and provinces of Laguna and Pangasinán, Luzón	72
A. Loher, Philippine orchids	30
Total	6,291
Foreign	3,463
Grand total	9,244

EXCHANGE AND DISTRIBUTION OF DUPLICATE BOTANICAL MATERIAL.

As the herbarium has been increased in size, the duplicate collections have been correspondingly increased, until we now have at least 40,000 specimens of all collections available for distribution and exchange. The value of this material was specified in my last report. The following has been distributed during the past year:

United States National Herbarium, Washington, D. C.	215
New York Botanical Garden, Bronx Park, N. Y.	43
Botanical Department, British Museum, London, England	2,552
Botanic Garden, Hongkong	188
R. Schlechter, Berlin, *Orchidaceæ* and *Asclepiadaceæ*	116
H. Christ, Basle, Switzerland, *Filices*	276
Philippine normal school, Manila	772
Total	4,162

In my last report mention was made of the proposed plan of issuing to the forestry schools of the United States sets of botanical material representing the most important timber trees of the Philippines. Three hundred species have been prepared according to this plan and issued under the label "Decades of Philippine Forest Flora" to the following institutions:

Bureau of Forestry, United States Department of Agriculture, Washington, D. C.	300
Biltmore Forestry School, Biltmore, N. C.	283
Cornell University, Ithica, N. Y.	268
University of Maine, Orono, Me., Forestry Department	248
Yale University, Forestry School, New Haven, Conn.	300
University of Michigan, Forestry School, Ann Arbor, Mich.	298
Arnold Arboretum, Jamaica Plain, Mass.	248
University of Minnesota, Forestry Department, Minneapolis, Minn.	219
Leland Stanford University, California	204
University of California, Berkeley, Cal.	179
New York Botanical Garden, Bronx Park, N. Y.	208
Total	2,755

In addition to the 4,162 specimens sent to other institutions for general distribution and exchanges, and the 2,755 specimens distributed in the "Decades of Philippine Forest Flora," 1,016 specimens have been sent by request or for identification to various specialists in Europe and America. In certain groups all our material, including our mounted sheets and all duplicates have been loaned to specialists for study. This material, with the exception of one specimen of each number, is returned to this office together with the identifications when the investigations are completed. These loans are as follows:

Oakes Ames, Ames Botanical Laboratory, North Easton, Mass., *Orchidaceæ*	299
J. M. McFarlane, University of Pennsylvania, Philadelphia, Pa., *Nepenthaceæ*	15
P. Sydow, Berlin, Germany, *Uredineæ*	17
O. Beccari, Florence, Italy, *Palmæ*	92
Total	423

The total number of duplicates distributed during the past year for all purposes is 8,356.

Many of the exchanges previously arranged, and enumerated in my last report, have been consummated, chiefly on account of lack of assistance in making up our duplicate sets, and delays incident to properly identifying our material. On the other hand, others have been arranged and completed, the most interesting and valuable collection received being the 880 specimens of Cuming's Philippine plants sent to us from the British Museum. Cuming collected in the Philippines in the years 1836–1840. Of the 880 specimens received no less than 350 are cotypes and most of the other numbers of the collection have been cited by various authors as representing certain species. The Hongkong plants received from the Botanic Garden at Hongkong are of especial value, because they assist us in determining the relationship of the Philippine flora to that of Southern China. In the past few months arrangements with the botanical department, Imperial University, Tokyo, Japan, have been made for an exchange of Philippine plants for those of Formosa, and these will be of especial value in our investigations of the flora of northern Luzón. Much work is now being done on our duplicate collections, and material will soon be ready for shipment to Sydney, Herbier Boissier, Tokyo, Calcutta, and other places, in exchange for material which has already been received from those institutions, and for such as is to be sent here at a later period

IDENTIFICATION OF MATERIAL.

As the work progresses we are becoming better prepared to identify our own material as it is received from the field. With our present equipment, we are now able on an average accurately to determine about 75 per cent of all specimens as far as the species is concerned, while practically everything can readily be identified to the genus, provided the material is sufficiently complete. The percentage of identifications to be made here will be a constantly increasing one.

As noted in my last report, the policy of distributing only identified material has been adopted except in the case of specimens which are sent to specialists for identification. Preliminary determinations will be made here, and whenever practicable, the undescribed species will be worked out in Manila, although the assistance of various specialists in some groups will be essential. In July, 1903, 2,302 specimens were sent to the Königl. Botanischer Garten und Museum, Berlin, for identification. Although this material has been in Berlin for more than two years, we have so far received the identifications of but about 670 specimens of the 2,302 which have been supplied, these being cited by number in Perkin's "Fragmenta Floræ Philippinæ." However, in the meantime most of the material has been identified in this office, excepting the apparently undescribed species, which have for the most part been left to botanists in Berlin. This plan of identifying material has proven to be so slow and unsatisfactory that it will be discontinued. In consequence of the great delay in receiving identifications from the above source, it became necessary to formulate some other plan, and accordingly it was decided to deal directly with specialists. This course has now been in force for about one year and is generally satisfactory.

During the past year a total of 1,831 specimens has been supplied to various specialists, either as loans, the material to be returned, or on the plan of offering the specimen sent to the specialists in return for the identification. In most cases results have been very promptly forwarded to us, not infrequently the identifications being received by return mail. I am under obligations to the following coworkers for these results: V. F. Brotherus, Helsingfors, Finnland, *Musci;* A. W. Evans, Yale University, New Haven, Conn., *Hepaticæ;* L. Radlkofer, Munich, Germany, *Sapindaceæ;* H. Hallier, Hamburg, Germany, *Convolvulaceæ;* C. B. Clarke, Kew, England, *Gesneraceæ, Acanthaceæ, Cyperaceæ;* Sir William T. Thistleton-Dyer and Mr. R. A. Rolfe, Royal Gardens, Kew, England, for miscellaneous identifications and comparisons with type material; E. Hackel, Graz, Austria, *Gramineæ;* D. Prain, Calcutta, *Leguminoseæ, Dioscoreaceæ;* A. Brand, Frankfort, Germany, *Symplocaceæ;* H. N. Ridley, Singapore, *Zingerberaceæ;* A. Engler, Berlin, *Araceæ;* J. M. McFarlane, University of Pennsylvania, Philadelphia, *Nepenthaceæ;* O. Beccari, Florence, Italy, *Palmæ;* R. Schlechter, Berlin, *Asclepiadaceæ;* Oakes Ames, North Easton, Mass., *Orchidaceæ.*

In addition to this work, approximately 2,000 identifications, largely of sterile material, have been made for the forestry bureau, and for Doctor Whitford in connection with his investigations on the ecology of the Lamao River region. None of this sterile material has been added to the herbarium.

In order to facilitate the work of identifying Philippine material, a card-catalogue index, in respect to Philippine plants, to all references in miscellaneous publications, monographs, periodical literature, etc., has been compiled. At the present time upward of 12,000 cards have been completed and arranged under families and genera and the work is being extended as opportunity permits.

INVESTIGATIONS AND WORK FOR OTHER BUREAUS.

Work for the forestry bureau has been continued, chiefly with reference to the identification of the most important timber trees of the archipelago, in order to correlate so far as possible the Philippine timbers and forest products with those of surrounding countries and to make available the results obtained by foreign investigators. About 3,000 identifications have been supplied to the chief of the forestry bureau in the past twelve months. At his request, descriptions of the ten most important timber trees of the archipelago have been prepared, consisting of a full synonomy regarding the scientific names, with references, of all native names known, together with full descriptions, and notes referring to the distribution and abundance of the various species in the Philippines; the extra-Philippine distribution for those species known to occur outside of the archipelago was also given. Plates representing the habit, leaves, fruits, and flowers have been prepared to aid in the identification of the species.

For the Bureau of Agriculture the work has consisted in the identification of economic species, food plants, fibers, etc., and many references regarding the uses of such plants, both in and outside of the Philippines, have been supplied the chief and various employees of that bureau.

The bureau of education has required work of a more systematic nature in order to aid the science teachers in their work on botany in the higher schools. Many identifications have been supplied to teachers who have submitted material for determination, and an effort has been made to interest teachers who are located in the provinces in the vegetation about them. This has been to the mutual advantage of the individual teachers and of this office. The Philippine normal school has been supplied with a mounted classified and arranged herbarium of 772 specimens, the material in part being the herbarium exhibited at the Louisiana Purchase Exposition, St. Louis. In May and June, 1905, Fortunato Alberto, a graduate of the normal school, was detailed to this office to collect and mount material for the provincial high schools. He prepared 1,800 specimens, collected near Manila and at Los Banos, Laguna province. This material was identified in this office, arranged in sets, and has been turned over to the bureau of education for distribution to the higher schools.

PUBLICATIONS.

During the past fiscal year the following botanical publications have been issued from this bureau: Merrill, "New or Noteworthy Philippine Plants," publication 17 of the bureau, 59 species being proposed as new, with notes on many others of interest. Merrill, "A Review of the Identifications of the Species Described in Blanco's 'Flora de Filipinas,'" publication 27 of the bureau, giving a summary of our present knowledge of the species proposed by Blanco, with full indices of both native and Latin names to the three editions of Blanco's work. This pamphlet was especially prepared to assist field workers in rediscovering Blanco's doubtful species, with a view to their final identification. Copeland, I. "The Polypodiaceæ of the Philippine Islands;" II. "New Species of Edible Philippine Fungi," publication 28 of the bureau. The first paper consists of the descriptions of 437 species of ferns, with keys to the families, genera, and species in the form of a manual; the second gives the description of 21 new species of edible fungi. The following papers are in press: Merrill, I. "New or Noteworthy Philippine Plants III," with the description of about 70 new species of Philippine plants; and II. "The Source of Manila Elemi," discussing this product and definitely determining its botanical source for the first time, publication 29 of the bureau. Publication No. 35, recently submitted, consists of the following papers: I. Merrill, "New or Noteworthy Philippine Plants IV;" and II. "Notes on Cuming's Philippine Plants in the Herbarium of the Bureau of Government Laboratories." III. Hackel, "Notes on Philippine Grasses." IV. Ridley, "Scitamineæ Philippinenses." V. Clarke, "Philippine Acanthaceæ." In addition to the above papers, Doctor Copeland has written and presented the manuscript of a paper entitled "On the Water Relations of *Cocos nucifera*," based on his investigations of the physiology of the cocoanut at San Ramón, Mindanao, November, 1904, to May, 1905. Mr. Elmer has nearly completed a paper in which all species of Philippine *Compositæ* are to be described, while Doctor Whitford is compiling data regarding the ecology of the Lamao River region, Mount Mariveles.

In addition to papers issued by this bureau, Doctor Copeland has published in Perkins's "Fragmenta Floræ Philippinæ," pages 175–194, 1905, the diagnoses of 42 new species of Philippine ferns and one new genus. These are entirely based on our collections. Under the title "Fungi Esculentes Philippinensis," published in "Annales Mycologici," 3: 25–29, 1905, the diagnoses of 21 new species of edible Philippine fungi are given, reprinted in Latin translation of the English in publication 28 of this bureau.

Dr. O. Beccari, Florence, Italy, has issued an article entitled "Le Palme delle Isole Filippine," in Webbia, pages 315–359, 1905, enumerating all the species of palms definitely

known from the Philippines and describing many new ones. Dr. V. F. Brotherus, Helsingfors, Finland, has published a contribution enumerating 40 species of Philippine mosses, of which 6 are described as new, entitled "Contributions to the Bryological Flora of the Philippines," in Ofversigt af Finska Vetenskaps Societetens Forhandlingar, volume 47, No. 14, pages 1–12, 1905. Oakes Ames, North Easton, Mass., has published an article entitled "A Descriptive List of Orchidaceous Plants Collected in the Philippines by Botanists of the United States Government," enumerating 62 species, of which 21 are described as new, 11 species being represented by plates or figures in "Orchidaceæ," Volume I, pages 63–111. The material on which these three papers was based was supplied by this office. Dr. J. Perkins, of Berlin, has continued the additions to her "Fragmenta Floræ Philippinæ," having completed the first volume of 212 pages. The second fascicle of this work, issued in June, 1904, contains many references to specimens supplied by this office, but the third has very few references to our material other than the part on ferns which was prepared by Doctor Copeland.

GENERAL RECOMMENDATIONS.

In my annual reports for the past three years, I have called attention to the necessity of the establishment of a thoroughly equipped botanical or experimental garden in connection with the botanical work of this office. The experimental garden controlled by the bureau of agriculture in Manila is hardly sufficient for the needs of that bureau, and, moreover, is not properly located for the purposes of a botanical garden. The "forest reserve" at Lamao, province of Bataán, established by the bureau of forestry, is primarily devoted to investigations of questions arising in connection with the forestry of the archipelago, although it is also being developed along the lines of a botanical garden. The location of this "reserve," its distance from Manila, and the difficulty of access to it, render it to a great extent unsuitable for a botanical garden in connection with the botanical work of this bureau. After a thorough consideration of the entire question, with due regard to proper location, accessibility, etc., I have the honor to repeat my suggestion, made in a former report, that the region about Antipolo, province of Rizal, Luzón, should be thoroughly investigated as a possible site for a large institution in the nature of a botanical and experimental garden, either under the control of this bureau or to be under the joint management of the three bureaus most interested, namely, of the laboratories, agriculture, and forestry.

Botanical exploration should be extended to the more remote regions and the higher altitudes of the Philippines, and the herbarium should be increased as rapidly as possible, consistent with necessary investigations on various problems of an economic nature which may arise, and for this purpose adequate financial provision for field parties should be made. The value of the herbarium as an adjunct to various other lines of investigation can not be overstated.

One vacancy exists at present in this office, and, if possible, this position should be filled by a botanist trained to undertake work on vegetable pathology. Systematic work, ecology, and the investigation of various economic plants are well provided for, but nothing has been undertaken in the very important branch of pathology.

During the past three and one-half years data regarding the economic uses of the various species have been gathered and are filed with the specimens in the herbarium. At the same time, a thorough investigation has been made of the various works treating of the economic botany of the Philippines. Now that the herbarium is well established as a basis for proper and authoritative identification of Philippine plants, and now that most of the species of an economic importance are represented, work on a publication describing the economic plants of the Philippines and calling attention to the various uses made of them in the Philippines, together with their value in the markets of the world, can be undertaken. Such a work would attract the attention of persons interested in the commercial side of various minor products to the possibility of extending production in the Philippines. Such an undertaking should include dyes, tannins, medicines, oils, resins, gums, rubber, gutta-percha, fibers, minor food products, etc., and it would materially aid in the development of the resources of the archipelago. It would, moreover, form an excellent basis for future extended work on the physical, chemical, and possible economic or medicinal properties of various products utilized by the natives.

ACKNOWLEDGMENTS.

Because of our present incomplete library, it frequently happens that the diagnoses of Philippine species in groups in which it is desired to make investigations are not available in Manila, and, accordingly, it has been necessary to send to various persons and institutions for copies of descriptions of Philippine and Malayan plants. To the following gentlemen I wish to express my thanks for literature sent: Dr. Wm. Trelease, director Missouri Botanical Garden, St. Louis, Mo.; Dr. F. V. Coville, Mr. P. L. Ricker, and Mr. C. R. Ball,

United States Department of Agriculture, Washington, D. C.; H. N. Ridley, director Botanic Garden, Singapore; S. T. Dunn, director Botanic Garden, Hongkong. To Dr. B. L. Robinson, Gray Herbarium, Cambridge, Mass.; Dr. M. Treub, department of agriculture, Buitenzorg, Java; Sir William T. Thistleton-Dyer, Royal Gardens, Kew, I am under obligations for their kindness in comparing material sent to them with type of authentic specimens of various species. To the various specialists mentioned above under identification of material, I am indebted for the examination of material and for identifications; and to others I wish to express my thanks for copies of papers on the Philippine flora and that of surrounding regions. To Capt. G. P. Ahern, chief of the forestry bureau, this office is indebted for several thousand specime s, collected by the employees of his bureau, and I also wish to thank him for his continued interest in the development of the botanical interests and resources of the archipelago.

REPORT OF ENGINEER.

The following is the report of W. P. Williams, engineer for the period from February 28, 1905, to August 31, 1905.

The work of installing the laboratory power plant commenced in February, 1904, and was far enough advanced in the beginning of September to allow of both gas and water pressure being furnished to the main building; steam being supplied by a 24 by 60 inch vertical boiler to a 2½ by 4 by 4 inch duplex pump, which maintained a water pressure through the building of 40 pounds per square inch.

The gas is supplied by two Mansfield Type-C oil-gas generators of 100 cubic feet capacity per hour each. Owing to the high price of cocoanut oil, formerly used for gas making, a number of experiments were made to find a cheap substitute. The mixture proving the most satisfactory was 50 per cent kerosene and 50 per cent of the cheapest grade of machine oil. Further investigation showed that the addition of 25 per cent of compressed air greatly improved the gas.

Gas is now supplied to the laboratory of the normal school. The consumption of the government laboratory is 15,000 cubic feet, and that of the normal school laboratory 5,000 cubic feet per month.

The entire installation, excepting the refrigerating machinery, was completed on February 28. All the machinery worked satisfactorily from the start, and so far has given no trouble.

The refrigerating machinery was tested on the 27th of May and put into service a week later. The machine is of a type new to the islands, but so far has proved itself capable of doing satisfactory work, after some alteration in the installation not referable to the machinery were made.

A very gratifying feature of the plant has been the performance of the Loomis-Manning pressure filters for the boiler feed water. After six months' operation it has not been found necessary to scale the boiler tubes, as nearly all the organic matter is removed by the filters, and the scale-forming material is easily removed by the surface and bottom blow-offs.

The Babcock & Wilcox boilers have proved to be economical steam generators, burning on an average of one ton of coal per day, and so far have cost nothing for repairs.

The installation of the machine tools was completed on June 25, 1905, and a large amount of repairing and remodeling of laboratory apparatus and equipment has been done since then.

The power produced ranges between 4200 and 4800 kilowatt hours per month the average cost being 16.040 centavos per kilowatt hour.

Month.	Power plant.			Gas plant.			
	Run.	Kilowatt hours.	Coal, engine building creamatory.	Kerosene.	Engine oil.	Coal.	Gas.
	Hours.		*Pounds.*	*Gallons.*	*Gallons.*	*Pounds.*	*Cu. feet.*
March	251.5	4398	55,650	110	110	3,000	15,000
April	177.5	4232	44,625	75	75	2,500	15,000
May	198.0	4550	57,500	115	115	3,000	15,000
June	237.5	4660	59,375	120	120	3,000	15,000
July	212.5	4580	67,151	100	100	3,000	15,000
August	232.0	4802	62,332	90	90	4,000	20,000
Total	1,309.0	27,252	346,663	610	610	18,500	95,000

[All costs in Philippine currency.]

	Cost.	
	Power plant (per kilowatt hour.)	Gas plant.
	Cents.	
Coal	7.455	₱138.25
Kerosene	.....	201.30
Labor	8.565	366.00
Supplies and repairs	.02	.....
Oil	.....	481.90
Repairs	.....	186.16
Total	16.040	1,373.61

Coal consumed per kilowatt hour, 9.94 pounds.
Total gas made, 95,000 cubic feet.

REPORT OF CHIEF CLERK.

The following is the report of Mr. Charles S. Sly, chief clerk:

The position of chief clerk in this bureau also has associated with it the duties of property clerk and cashier. This report therefore includes a statement of the value of work performed free of charge for the fiscal year 1905, and showing for whom the work was performed; a statement showing the amount of cash received and the value of free work performed credited to the division of the bureau which performed the work; a statement showing the condition of the appropriations made for the support of the bureau for the fiscal year 1905.

During the year the record clerk has completely revised the reference files which contain all of the correspondence records since the organization of the bureau and prepared a thorough and accurate index of the same.

The consolidation of all the clerical force, heretofore distributed in the various divisions of the bureau, has materially increased the efficiency of the office.

From the system of accounts adopted July 1, 1904, a monthly statement of the condition of appropriations made for the support of the bureau has been rendered. The ease and accuracy with which a statement of the financial condition of the bureau can be made at any time has more than compensated for the extra labor in keeping them. In the next year these accounts will be somewhat extended in order to include the cost of operating and maintaining each subdivision of the bureau.

The office force, which is none too large under the most favorable conditions, has been severely taxed during the last six months owing to the necessity of detailing one of the stenographers as acting librarian. The salaries for the clerical force amount to but 8 per cent of the total for salaries appropriated for the bureau, and, as the number in it is so small, it is always seriously handicapped when anyone is absent on leave or by reason of sickness. It is evident that no matter how many or how few are away filing reports, the bookkeeping, and the balances must be kept parallel with the running operations of the bureau. Owing to this fact the clerical force can not lay aside any particular piece of work until opportunity offers to take it up, and thus distribute its work over longer periods of time. For this reason some additional clerical aid is imperatively needed.

Financial statement, July 1, 1904, to June 30, 1905—Fiscal year 1905.

Subject.	Appropriation.	Expended.	Balance.
Transportation	₱2,000.00	₱1,850.80	₱149.20
Rent	1,050.00	825.00	225.00
Telephones	288.00	420.00	.....
Chemicals and supplies	10,000.00	10,219.51	.....
Small animals	2,000.00	1,557.06	442.94
Feed for small animals	500.00	487.46	12.54
Ice and distilled water	1,500.00	1,426.50	73.50
Office supplies	1,400.00	1,615.03	.....
Herbarium cases	500.00	367.52	132.48
Photographic supplies	2,000.00	2,930.40	.....
Telegrams and cables	200.00	4.80	195.20
Lights	100.00	93.97	6.03
Repairs to apparatus	500.00	894.72	.....
Post-office box	32.00	32.00	.....

Financial statement, July 1, 1904, to June 30, 1905—Fiscal year 1905—Continued.

Subject.	Appropriation.	Expended.	Balance.
Briquettes, etc., for gas	₱1,500.00	₱1,355.33	₱144.67
Purchase of seed, etc.	200.00	161.85	38.15
Labor for moving	350.00	138.20	211.80
Duties	4,900.00	38.33	4,861.67
Eggs, meat, etc	.....	61.29	.....
Postage	.....	449.60	.....
Laundry	.....	.....	244.68
Purchase of alcohol	.....	493.25	.....
Fire hose, etc	700.00	564.93	135.07
Electric lamps	750.00	645.05	104.95
Coal, oil, etc	10,000.00	4,740.97	5,259.03
Chemicals and apparatus (80)	29,700.00	27,370.98	2,329.02
Books	25,860.00	14,893.25	10,966.75
	96,030.00	73,882.48	20,724.52
Transferred from ethnological survey	800.00	.....	800.00
	96,830.00	.....	22,947.52
Undelivered requisitions and other outstanding obligations	.....	.....	20,157.48
Total	.....	.....	2,790.04

Cash receipts for work performed and supplies sold, by departments of the bureau, for fiscal year 1905.

Month.	Chemical.	Biological.	Serum.	Photographer.	Total.
1904.					
July	₱215.00	₱556.00	₱214.55	₱12.00	₱997.55
August	142.00	123.00	576.51	1.50	843.01
September	228.40	50.00	411.10	8.64	698.14
October	497.00	153.10	145.15	9.80	805.05
November	103.00	77.00	496.80	.....	676.80
December	164.00	82.00	2.35	7.96	256.31
1905.					
January	219.00	90.00	267.01	1.00	577.01
February	206.00	98.08	716.08	2.00	1,022.16
March	162.00	91.85	491.00	1.20	746.05
April	49.00	43.00	1,478.70	303.60	1,874.30
May	168.30	83.50	32.55	20.24	304.59
June	91.00	86.70	326.09	940.80	1,444.59
Total	2,244.70	1,534.23	5,157.89	1,308.74	10,245.56

Free work performed and supplies furnished, by departments of the bureau, for fiscal year 1905.

Month.	Chemical.	Biological.	Serum.	Photographer.	Total.
1904.					
July	₱1,875.00	₱5,950.50	₱17,476.50	.....	₱25,302.00
August	662.50	4,802.50	10,521.88	₱47.92	16,036.80
September	612.88	5,156.00	8,630.00	145.72	15,544.60
October	1,521.00	6,096.48	8,847.00	100.00	16,564.48
November	3,282.00	6,407.75	7,512.00	415.00	17,616.75
December	3,106.00	6,626.12	10,963.50	151.84	20,847.46
1905.					
January	923.00	6,121.00	15,080.50	14.00	22,138.50
February	2,059.00	7,554.00	13,733.00	403.28	23,749.28
March	979.00	7,442.00	17,324.50	434.72	26,180.22
April	787.00	5,054.70	14,140.30	76.68	20,058.68
May	598.50	5,748.24	6,944.00	260.70	13,551.44
June	536.00	7,331.00	11,721.00	63.62	19,651.62
Total	16,941.88	75,290.29	142,894.18	2,113.48	237,241.83
Cash receipts	2,244.70	1,534.23	5,157.89	1,308.74	10,245.56
Aggregate	19,186.58	76,824.52	148,052.07	3,422.22	247,487.39

Statement of the value of work performed free of charge for the fiscal year 1905.

	July.	August.	September.	October.	November.	December.
Board of health, miscellaneous	₱4,949.00	₱3,601.44	₱4,765.00	₱4,992.00	₱4,965.00	₱5,661.44
Board of health, serums and vaccines	17,410.50	10,368.88	8,555.00	8,802.00	7,488.00	10,933.50
Civil hospital	1,065.50	1,367.50	1,056.00	1,129.48	1,525.75	1,053.60
Bureau of internal revenue	150.00	90.00	.....	375.00	1,825.00	2,660.00
Customs house	268.00	339.00	308.00	621.00	252.00	45.00
St. Luke's Dispensary	38.00	3.00	.....	.....	10.00	6.00
Mining bureau	160.00	.....	.....	195.00	.....	.....
Bureau of engineering	95.00	105.00	10.00	.....	615.00	240.00
Insular purchasing agent	100.00	46.00	463.00	80.00	239.00	.....
Public Health and Marine-Hospital Service	66.00	60.00	45.00	45.00	24.00	30.00
Bureau of agriculture	1,000.00	.....	84.88	75.00	40.00	1.92
Bureau of education	.....	14.52	.....	.....	141.32	.....
Forestry bureau	.....	21.96	42.72	.....	.....	.....
Bilibid prison	.....	.....	30.00	.....	.....	.....
Philippine constabulary	.....	7.50	32.00	2.00	.....	14.00
Ethnological survey	.....	12.00	.....	2.16	256.48	116.20
Treasurer, Philippine Islands	.....	.....	30.00	.....	.....	25.00
Secretary of the interior	.....	.....	98.00	244.84	21.20	31.80
Bureau of coast guard and transportation	.....	.....	3.00	1.00	171.00	.....
Bureau of architecture	.....	.....	2.00	.....	20.00	20.00
Civil sanitarium	.....	.....	20.00	.....	.....	.....
Indigents	.....	.....	.....	.....	11.00	9.00
Philippine weather bureau	.....	.....	.....	.....	12.00	.....
Total	25,302.00	16.036.80	15,544.60	16,564.48	17,616.75	20,847.46

	January.	February.	March.	April.	May.	June.	Total.
Board of health, miscellaneous	₱4,803.00	₱4,930.00	₱5,041.00	₱3,819.00	₱3,695.24	₱4,849.00	₱56,071.12
Board of health, serums and vaccines	14,904.00	13,605.50	17,099.50	14,020.00	6,928.24	11,481.00	141,596.12
Civil hospital	1,284.50	1,512.00	1,423.00	585.00	1,185.00	1,413.00	14,600.33
Bureau of internal revenue	25.00	10.00	25.00	90.00	121.92	.....	5,371.92
Customs house	446.00	840.00	491.00	332.00	269.50	50.00	4,261.50
St. Luke's Dispensary	20.00	.....	6.00	.....	.....	10.00	93.00
Mining bureau	.....	30.00	53.00	140.00	.....	.....	578.00
Bureau of engineering	87.00	95.00	173.00	.....	.....	.....	1,420.00
Insular purchasing agent	34.00	725.00	27.00	45.00	50.00	5.00	1,814.00
Public Health and Marine-Hospital Service	70.00	90.00	90.00	120.00	90.00	126.00	856.00
Bureau of agriculture	75.00	28.60	75.00	75.00	75.00	52.00	1,582.40
Bureau of education	.....	7.92	108.92	15.00	15.92	.....	303.60
Forestry bureau	.....	.....	1.50	.....	36.76	258.76	361.70
Bilibid prison	210.00	1,212.00	1,098.00	729.00	1,012.00	1,286.00	5,577.00
Philippine constabulary	.....	40.50	105.00	.....	14.00	25.00	240.00
Ethnological survey	2.00	.96	16.80	51.20	15.88	21.12	494.80
Treasurer, Philippine Islands	.....	.....	.....	.....	.....	.....	55.00
Secretary of the interior	.....	290.80	.....	.....	.....	.....	686.64
Bureau of coast guard and transportation	.....	191.00	101.50	.....	.....	1.50	469.00
Bureau of architecture	30.00	12.00	60.00	.....	.....	.....	114.00
Civil sanitarium	30.00	9.00	3.00	.....	6.00	10.00	78.00
Indigents	18.00	6.00	12.00	9.00	9.00	6.00	80.00
Philippine weather bureau	.....	.....	.....	5.48	11.00	2.40	31.88
Bureau of public printing	130.00	.....	.....	.....	.....	.....	130.00
Coast and Geodetic Survey	.....	63.00	170.00	9.00	15.98	24.84	282.82
Secretary of public instruction	.....	50.00	.....	.....	.....	.....	50.00
Civil service board	.....	.....	.....	3.00	.....	.....	3.00
Secretary of commerce and police	.....	.....	.....	10.00	.....	.....	10.00
Insular cold storage and ice plant	.....	.....	.....	.....	.....	30.00	30.00
Total	22,138.50	23,749.28	26,180.22	20,058.64	13,551.44	19,651.62	237,241.83

APPENDIX K.

REPORT OF THE BUREAU OF PUBLIC LANDS.

MANILA, P. I., *September 12, 1905.*

SIR: I have the honor to submit herewith the annual report of the bureau of public lands for the year ended August 31, 1905.

PUBLIC LANDS.

As stated in my last annual report, forms had been prepared for making application for land under the first four chapters of the public-land act, No. 926, relating respectively to homesteads, sales, leases, and free patents. All the forms Nos. 7, 8, 9, 10, 11, 12, 13, and 14 have been translated into Spanish. The printed forms, both English and Spanish, were delivered to this bureau by the bureau of public printing in separate lots during the months from September, 1904, to January, 1905. A homestead circular, a lease circular, and a circular of information as to blank forms also have been prepared and printed in both the English and Spanish languages. Copies of the printed forms, circulars, and the public-land act were given to all parties who made application therefor. A circular under Chapter II, Sales, is being prepared.

Since the last annual report was rendered 270 homestead applications have been received. Of this number, 3 were rejected, 4 relinquished or withdrawn, and 22 entries allowed, leaving 241 applications not in proper form. The greater part of these applications were received during the last six months. Some of those not in proper form are awaiting a reply from the forestry bureau as to whether the land applied for is more valuable for forest than for agricultural uses; on some the entry fee of 10 pesos is still due; others have been returned to applicants for correction.

Applications for free patents have been made by 188 natives. Forty of these were in proper form, 12 were rejected, the remainder (136) are still incomplete.

One application, by an individual, to lease 700 hectares of land was received in August, 1904, but was canceled at applicant's request in October, 1904. No other application to lease public land has been received.

Applications to purchase agricultural public lands have been made by 36 individuals, mostly natives; also by 2 unincorporated companies, both American. One of the latter applications has been withdrawn; the other, which is still pending, is for 96 hectares, and is made by a company composed of 6 Americans. A priest, from Surigao Province, in the name of the Catholic Church, has made application to purchase 1 hectare of public land for the use of a cemetery. This application must be rejected, as there is no provision of law by which this bureau can dispose of public land for such use.

No application by a corporation for the purchase or lease of public lands has been received. A corporation may purchase 1,024 hectares, equivalent to about 2,530 acres, and also it may lease a like amount for twenty-five years, at the end of which time the lease may be renewed for a second period of twenty-five years. In this way it may secure control of over 5,000 acres.

Eight applications to purchase public lands in Cagayán, Mindoro, Unión, and Rizal provinces are now pending, because of the impossibility of examining and appraising the lands in question with the present office force. The estimates for the expenses of the bureau during the present fiscal year, now before the Philippine Commission, make provision for the removal of this cause of delay by the appointment of special agents to perform the necessary duties.

In accordance with the provisions of section 38, Act No. 926, on December 28, 1904, the Philippine Commission adopted a resolution reserving certain public lands for a town site at Baguio, in Benguet Province.

In accordance with section 59, Chapter VI, of Act No. 926, the clerk of the court of land registration has forwarded to this bureau notices of application to register land and a plat of the land claimed in 45 cases. As soon as citations are served on me in these cases,

my complete file in each case, containing evidence of a search among the Spanish archives of the bureau, is sent to the attorney-general in order that he may more intelligently represent the government in handling the cases. Citations have been served on me by the court of land registration in 47 other cases, in which it is believed public lands were involved, but in which cases application to register the land was not made under the provisions of the public-land act. In each of these latter cases a search was made among the Spanish archives and a letter written to the attorney-general, giving him the benefit of the search and asking that the government's interests be protected.

The following table shows the number of applications and declarations of location made for public land and mining claims since the last annual report, so far as shown by the data now in this bureau, which, with regard to mining claims, is incomplete, because of the failure of the great majority of the provincial secretaries to respond to the request of the bureau for the usual report of mining locations recorded during the year.

Public-land applications and locations.

Province.	Homestead.	Sale.	Lease.	Free patent.	Mining claim.	Coal claim.	Total.
Albay	5					11	16
Ambos Camarines	6			1	154		161
Antique							
Bataán							
Batangas					10		10
Benguet							
Bohol		1					1
Bulacán	3				6		9
Cagayan	3	3					6
Cápiz							
Cavite							
Cebú						16	16
Ilocos Norte	24	9			3		36
Ilocos Sur	49	3					52
Iloílo							
Isabela	29			100			129
Laguna	35			44	3		82
Lepanto-Bontoc					41		41
Leyte	1						1
Masbate	15				58		73
Mindoro	8	2				10	20
Misamis					2		2
Moro							
Neuva Ecija							
Nueva Vizcaya							
Occidental Negros	9	1		1			11
Oriental Negros	10			3			13
Pampanga							
Pangasinán	5				16		21
Palawan							
Rizal	2	16		38	8		64
Romblón	3				1		4
Sámar							
Sorsogón							
Surigao		1			6		7
Tárlac	33			1			34
Tayabas	15	1					16
Unión	1	2					3
Zambales	14						14
Total	270	39		188	308	37	842

FRIAR LANDS.

By 4 executory contracts, signed on December 22, 1903, 1 with the British-Manila Estates Company, 1 with La Compañia Agrícola de Ultramar, 1 with the Recollet Order of the Philippine Islands, and 1 with the Philippine Sugar Estates Development Company, the government of the Philippine Islands stipulated for the purchase of the lands claimed by said organizations in the Philippine Islands, as was authorized by section 64 of the act of Congress of July 1, 1902. (32 U. S. Stats., 691.) These contracts are printed at length in Part I of the report of the United States Philippine Commission for 1903, beginning at page 204.

The lands claimed by the British-Manila Estates Company composed what is known as the Imus estate, situated in the municipality of that name, in the province of Cavite.

The lands contracted for with La Compañía Agrícola de Ultramar composed the following estates, viz, Banilad and Talisay-Minglanilla, in Cebu Province; Muntinlupa, Tala, and Piedad, in Rizal Province; San Francisco de Malabon, in Cavite Province; Dampol,

Malinta, Binagbag, Matamó, San Marcos, and Guiguinto, in Bulacán Province; and Isabela, in Isabela Province.

The contract with the Recollet Order was for the San José estate on the southwestern coast of Mindoro.

The Philippine Sugar Estates Development Company contracted for the sale of the following estates, viz, Biñan, Calamba, and Santa Rosa, in Laguna Province; Lolomboy and Santa María de Pandi, in Bulacán Province; Naic and Santa Cruz de Malabón, in Cavite Province; and Orión, in Bataán Province.

The San Jose estate, in Mindoro, was the first estate conveyed to the government in pursuance of the contracts, the deed being dated October 4, 1904. By 8 deeds, all dated October 24, 1904, La Compañía Agrícola de Ultramar conveyed the Isabela, Binagbag, Tala, Piedad, Muntinlupa, Malinta, Dampol, and Talisay-Minglanilla estates, and by 5 deeds dated October, 26, 1904, the company conveyed the other estates mentioned in their contract, to wit, San Francisco de Malabón, San Marcos, Matamo, Guiguinto, and Banilad.

The British-Manila Estates Company conveyed the Imus estate to the government by deed dated February 6, 1905.

The contract for the purchase of the estates claimed by the Philippine Sugar Estates Development Company has not yet been consummated, and none of these estates have been conveyed to the government.

The following table shows the names of the estates that have been conveyed to the government, the province in which each is located, the purchase price and area of each, the names of the grantors, and the dates of the deeds.

Data in re friar lands.

No.	Name of estate.	In what province.	Purchase price.	Area.	Grantors.	Date of deed.
				Hectares.		
1	San José	Mindoro	$298,782.07	23,266.00	Recollet Order	Oct. 4, 1904
2	Isabela	Isabela	159,858.01	19,891.00	Cia. Agrícola de Ultramar	Oct. 24, 1904
3	S. F. de Malabón	Cavite	534,937.41	11,449.00	do	Oct. 26, 1904
4	Binagbag	Bulacán	17,936.38	294.75	do	Oct. 24, 1904
5	Tala	Rizal	112,054.33	6,696.00	do	Do.
6	Piedad	do	165,171.72	3,860.00	do	Do.
7	Muntinlupa	do	43,838.53	2,827.00	do	Do.
8	Malinta	Bulacán	220,210.66	3,574.00	do	Do.
9	San Marcos	do	6,162.39	87.42	do	Oct. 26, 1904
10	Matamo	do	841.09	11.80	do	Do.
11	Dampol	do	75,323.78	928.93	do	Oct. 24, 1904
12	Guiguinto	do	77,783.94	945.68	do	Oct. 26, 1904
13	Banilad	Cebú	105,999.76	1,925.00	do	Do.
14	Talisay-Minglanilla.	do	553,893.48	8,020.00	do	Oct. 24, 1904
15	Imus	Cavite	1,036,012.15	18,243.00	British-Manila Estates Co.	Feb. 6, 1905
	Total		3,408,805.70	102,019.58		

The deeds of conveyance of these estates, when received in this bureau, were recorded at length, and each record duly certified, as required by section 6 of the friar lands act, No. 1120, as amended by act No. 1287 of January 23, 1905.

The administration of the estates is placed in this bureau by the friar lands act, No. 1120, and pursuant to that law the administration was begun by taking charge of the San Francisco de Malabón estate, in Cavite Province.

Accompanied by Mr. Rafael Del Pan, the government's special counsel, I went to the town of San Francisco de Malabon, on the 29th of last March, and called a meeting of the occupants of that estate. Mr. Del Pan addressed them in Spanish, and explained to them the object of the government in taking charge of the estate and in asking them to execute temporary leases for the lands held by them, as provided in section 13 of the friar lands act.

A great many questions were asked by the occupants in regard to the government's intentions, some of which I did not feel that I ought to attempt to answer without consultation with the governor-general. Consequently, Mr. Del Pan and I returned to Manila from San Francisco de Malabón, and laid before the governor-general a number of inquiries which we had carefully formulated, with the assistance of some of the former tenants of the estate. Having received the governor-general's instructions, we returned to San Francisco de Malabón and explained to the people the government's intentions in regard to the future renting and sale of the various holdings on the estate.

The fact that the occupants of this estate for many years had been holding their lands without paying any rent naturally made them very averse to assuming the responsibility

of tenants, and considerable delay resulted from this attitude. However, they finally commenced making leases, and, after the work was well under way, I put a clerk in charge of it and went to the town of Imus with Mr. Del Pan to take charge of that estate. The beginning of the work at Imus was even more difficult than it had been at San Francisco de Malabón, not only for the same reasons that operated at the latter place, but for the further reason that many of the occupants of the Imus estate, at various times extending over a period of some years, had been induced by Filipino lawyers and others to contribute money for the purpose of establishing their rights to the portions of the estate that they were occupying, and they had been informed by the persons to whom they paid the money that a certain suit or suits involving their ownership of the said land had been decided in their favor. Consequently, many of them, in perfectly good faith, believed that their ownership of their holdings had been legally established, and it was only after considerable difficulty and an investigation of the court records that we were able to convince them that they had been deceived in regard to the matter.

Many difficulties and delays, arising from the ignorance of the people and the fact that they had beeen frequently deceived by those in whom they had a right to confide, have arisen in the course of the work on both of these estates.

The Malinta, Guiguinto, San Marcos, Matamó, Dampol, and Binagbag, estates, in Bulacán Province, have also been taken charge of, as well as the Tala and Piedad estates, in Rizal Province.

Much the same difficulties were encountered on all the estates, but the work is progressing. The following table shows how many temporary leases have been executed on each estate to September 1, 1905, the total area leased, and the amount of rental due annually on such leases:

Friar lands temporarily leased.

Name of estate.	Number of leases.	Area leased.	Annual rental.	
		Hectares.		
San Francisco de Malabón	837	1,978.7991	₱13,169.98	86,584.99
Tala	53	75.9575	432.08	216.04
Piedad	35	82.9300	470.48	236.24
Malinta	68	175.4100	996.08	498.04
Matamó	1	11.8000	68.00	34.00
Dampol	86	127.8365	633.40	316.70
Imus	457	1,515.0418	8,955.52	4,477.76
Total	1,537	3,967.7749	24,725.54	12,362.77

The friar lands act, which places the administration of these estates in this bureau, provides that the lands shall be leased and sold to those who were actual, bona fide settlers and occupants thereon at the time the lands were conveyed to the government.

Pending an investigation and survey requisite to fix the precise area, description, and value of each holding, the law authorizes me to require the occupants of the estates to attorn to the government as its tenants and pay a reasonable rent for the use of their holdings. These temporary leases are the ones now being made and are intended to be replaced by regular leases or contracts of sale as soon as the different holdings can be surveyed, classified, and appraised and their areas accurately determined.

When the holdings shall have been surveyed and their boundaries and value ascertained the law provides that the occupants may either lease them for not exceeding three years or may enter into contracts to purchase them. Such holdings must, under the law, be sold at their actual cost to the government, and purchasers are allowed ten years from the date of purchase within which to pay for the same, all deferred payments to bear 4 per cent interest per annum. The law directs that in ascertaining the amount at which a holding must be sold there must be taken into consideration its location and quality and any other circumstances giving it value, and the basis of valuation, so far as practicable, shall be such that the aggregate of the values of all the holdings included in an estate shall be equal to the cost to the government of the entire estate, including the cost of surveys, administration, and interest upon the purchase money to the time of the sale.

This bureau is convinced that in the making of the temporary leases on the friar lands estates in a large number of instances claimants have misrepresented to its employees not only the area but the quality of the tracts they were holding. In the absence of an accurate survey of such holdings and an individual inspection of each it was impossible to prevent this. But with a view to enabling the surveyors now at work on the estates accurately to describe the various classes of land contained in each holding it became necessary to have a careful examination made of the character of the soil by a competent person.

Through the kindness of Mr. W. C. Welborn, chief of the bureau of agriculture, Mr. A. M. Sánchez, soil physicist of that bureau, was detailed for the work. I understand that he has about completed his inspection of the San Francisco de Malabón and Imus estates, and that his report will be made within a week.

The data collected by him will be furnished to the surveyors as a guide to them in classifying the lands.

No permanent lease or contracts of sale have yet been executed, as the survey of the individual holdings has not progressed sufficiently.

The first rents under the temporary leases became due in July, 1905, and the total rents collected to September 1, 1905, have been ₱3,650.13.

The Muntinlupa estate in Rizal Province, the two in Cebú, and the one in Isabela will be taken charge of as soon as the employees can reach that work.

SURVEYS.

Under the law all public land, whether agricultural or mineral, must be surveyed by or under the direction of the chief of the bureau of public lands before final action can be taken for its transfer to private parties. The outer boundaries of the friar estates were surveyed by the bureau of engineering, but the task of subdividing these extensive tracts into lots for lease or sale to the individual occupants must be carried out by this bureau.

Section 46 of the act of Congress of July 1, 1902, provides that the chief of the bureau of public lands may appoint deputy mineral surveyors to make the official surveys of mining claims. If this could be done it would relieve this bureau of the field work of this branch of the surveying and would require only the office work to be done directly by the government employees. However, since that act went into force only three applications have been made for these appointments. Two men were appointed, but both resigned without having done any work. The other application is still pending.

To meet the demands for surveying work appropriation was made for 12 surveyors and transitmen, all Americans; and 12 chainmen, Filipinos, for field work for the fiscal year ending June 30, 1905. For the office work provision was made for 1 surveyor and 1 American and 4 Filipino draftsmen.

Great difficulty has been experienced in filling these places with competent men, and the work has suffered great delay in consequence.

The surveying force of the bureau at present consists of 2 clerk-surveyors, 8 transitmen, 4 chainmen, and 2 draftsmen.

There still remain 2 vacancies for surveyors, 8 for chainmen, and 3 for draftsmen. These will be filled as soon as competent men can be secured. Besides the regular employees, the bureau has had the services of Mr. H. M. Ickis, detailed from the mining bureau, who is engaged in surveying mining claims in Masbate, and for a few weeks it had the services of Mr. George H. Guerdrum, detailed from the bureau of engineering.

The force now appropriated for is inadequate to do the work required, and in the estimate for this year a substantial increase is asked for. This increase is essential if the work is to be kept anywhere near up to date.

FRIAR LANDS SURVEYS.

The first work undertaken on the survey of the friar lands estates was in connection with the hacienda of San José, in southern Mindoro. This estate had not been surveyed by the bureau of engineering, and it was decided to make a complete survey of the boundaries and the holdings of the tenants, as well as a topographic survey of the whole surface of the tract.

On March 15 a party consisting of 1 surveyor, 2 transitmen, 2 chainmen, and a cook left Manila for Magarán, Mindoro, to take up this work. The party was accompanied by Mr. George H. Guerdrum, assistant engineer, bureau of engineering, who was temporarily detailed to this bureau. Mr. Guerdrum organized and directed the work until April 6, when he returned to Manila, leaving a surveyor of this bureau in charge. The party returned to Manila on August 27, after a successful season's work.

There is still some office work of platting and computation remaining to be done before the definite results of the survey can be given. It is expected to have everything completed by the middle of September. The following statistics show in a general way the results accomplished:

Number of square miles of topography	85
Number of meters of traverse	237,600
Number of triangulation stations	17
Number of azimuths observed	2
Number of field sheets	8
Length of boundary, in miles	43

SUBDIVIDING FRIAR LANDS.

The question of the method to be employed in subdividing the thickly populated portions of the friar lands estates is rather intricate. There are extensive tracts of land to be divided into separate holdings, the majority of which are extremely small. Some of these lots contain only 2 ares, and hundreds of them are less than 1 hectare.

Monuments of cement or stone or marks on permanent structures when available are established at suitable intervals, the distances between them depending on the number of tracts in the vicinity and whether or not they are easy of access from the monuments. These monuments are then connected with each other and with the existing monuments on the exterior boundary by closed traverses.

The stations on these traverses are marked with good stubs and form semipermanent points. After the system of traverses is completed, it is computed and balanced and the coördinates tabulated. Each station then forms a starting point for the short subsidiary traverses that are run among the lots, beginning and ending at known points. The corners of each lot are determined by side shots from the traverse points. Azimuths are observed on the sun at controlling points.

The data descriptive of the leased lots is copied from the leases on cards, each lot being on a separate card. These are furnished to the surveyors and form the means of identifying the individual lots.

Work was begun on San Francisco de Malabón estate by a party leaving Manila on June 15. This party consisted of three surveyors and two chainmen.

The illness of one member of the party necessitated his return to Manila to the hospital on July 3. Since that time the party has been under the direction of two surveyors only.

The work has been somewhat delayed by the weather during the present unfavorable season, but it is considered advisable to keep the men at work, in view of the necessity for early results.

The reconcentration of the occupants of the estate, because of the condition of lawlessness existing in Cavite Province, was also a cause of delay and inconvenience, it being practically impossible to work on lot boundaries unless the occupants are present to point out their lines. However, most of the time that this measure was in force was profitably occupied in putting in the control traverses.

The following statistics show in a general way the results accomplished to date:

	Number.
Meters of control	12,688
Meters of secondary traverse	4,647
Azimuths observed	7
Lots finished	257

On July 22, a party, consisting of two surveyors, two chainmen and a cook, was sent to the Imus estate to undertake the survey of the individual holdings.

The following statistics show the results accomplished up to date:

	Number.
Meters of control run	48,005
Azimuths observed	4
Lots laid out	135
Lots finished	30

MINING CLAIMS.

Up to date, applications for surveys have been made for 12 coal claims and 6 placer claims.

One of the coal claims, situated in Bulalacao, Mindoro, was surveyed in January. The expense for transportation and laborers was borne directly by the owner. The bureau was reimbursed in the sum of ₱145.50 for the salary of the surveyor for the time absent from Manila, and for the office expenses of computing and drafting.

On April 7, the Philippine Mining Co. made application for the survey of 4 placer claims, situated in the municipality of Aroroy, Masbate Province. The claims are situated in the valley of the Lauang River and are supposed to contain in all 120 hectares. There being none of the bureau's surveyors available for the work, application was made to Mr. McCaskey, chief of the mining bureau, for the loan of a man. This request was at once granted, with your approval, and Mr. H. M. Ickis, field assistant, mining bureau, left on May 9 for the field. On June 9 the same company made application for the survey of two more claims of the same character, aggregating 72 hectares. The application regarding one of these claims of 8 hectares was subsequently withdrawn, and on June 16 an order was sent to Mr. Ickis to make a survey of the remaining one.

This work has been unavoidably interrupted and is not yet completed. A deposit of ₱800 in all was made to cover the estimated expenses.

On July 28, an application was made for the survey of 11 coal claims on Batan Island, province of Albay. It is expected that a surveyor will be sent early in September to do this work.

During the year two small surveys were made at the request of the attorney-general. One of these was of a city lot in Manila, in the district of Paco. The other was of the land of the old "Fábrica de Puros de la Princesa" in Malabón, Rizal Province.

DRAFTING.

The work in the drafting room has been of a miscellaneous character.

Tracings and prints of plans in the Spanish archives have been furnished whenever required to accompany certified copies of records.

All the maps and plans of the friar lands estates required for the use of the clerks in charge and the survey parties have been furnished, mostly in the form of blueprints.

The survey parties have required a number of tables of different kinds to facilitate the work of computing and to furnish the requisite data. Wherever these have been found in print in suitable form tracings have been made. These tracings are kept on file and whenever necessary blueprints are made for use in the field.

A list of these tables already prepared follows: 1, Table of Mean Refraction; 2, Table of Corrections to Mean Refraction; 3, Table of Curvature and Refraction; 4, Table of Inclination of the Meridian; 5, Table of Length of Normal to the Earth's Surface; 6, Monthly Ephemeris of the Sun.

Besides the above, nearly all of which were copied directly from published tables, though in some cases with slight modification, a stadia table, giving corrections to horizontal distances and the elevations for vertical angles from 0° to 10° has been computed and traced.

All of the maps and plans on file in the bureau have been numbered and indexed. They number 180 in all, the majority being in connection with the friar lands estates.

SPANISH LAND TITLES.

During the year ending August 31, 1905, there were examined and entered on the tabulated lists of expedientes relating to Spanish land titles, the following:

Expedientes of sales and composiciones	5,209
Expedientes of illegal appropriations	385
Total	5,594

This number added to that of the expedientes examined and entered prior to September 1, 1904, makes a total of 19,665 so far examined and listed.

There are still many unlisted expedientes to be examined, but it is believed that all of these may be completed within the coming year.

During the year just past 63 certified copies of Spanish documents were made, and 49 certified copies of maps or sketches. The number of words contained in the certified copies was 98,400, and the fees received for the copies, searches, and certifications amounted to $105.40, United States currency.

In connection with the above I have to say that I have examined into the question of actual cost of making these certified copies of Spanish land titles, and am convinced that the present schedule of fees authorized to be collected therefor is insufficient to reimburse the government for the labor actually performed. As soon as possible I shall submit for your consideration a new schedule that will correct this condition.

THE SAN LÁZARO ESTATE.

CONSTRUCTION AND IMPROVEMENT OF STREETS.

Since the beginning of the resurvey of this estate on February 17, 1904, in accordance with the official plans of the city engineer of Manila, approved by the Civil Commission and the municipal board of Manila, there have been reserved for the extension of the existing street system certain tracts of land, properly located, 18 meters wide, and aggregating 4,800 linear meters.

For the widening of existing streets there have been reserved other tracts of various widths aggregating 5,600 linear meters.

With the exception of Calle Cervantes, which has been put into excellent condition for about 1,000 linear meters north from Calzada de Bilibid, very little has been done to remedy the almost intolerable condition of the public thoroughfares.

It is true, that in the recently platted district to the north of the hospital, there have been built some 1,100 linear meters of provisional roadways, from 3 to 3.5 meters in width; but these have been constructed through the center of the 18 meter space reserved for street purposes, and the dirt used in their construction has been removed from both sides of the roadbed, thereby leaving holes and depressions in which rain water collects, forming stagnant pools of mud and slime.

As it is impossible for the tenants to reach their homes without wading through this filth, they have been compelled to build paddies or dikes from the roadways to their doors, thus preventing the escape of such surface water as might find a natural source of drainage. Many of the tenants have had to build bridges from their doors to the roadways.

These conditions are accounted for by the fact that the appropriation for public improvements in the city of Manila has been too small to allow of the necessary expenditures which would be occasioned by the adequate improvements to the streets in San Lázaro.

DRAINAGE.

As the grade of the majority of streets in this district is higher than the adjoining land, and as there are very few drainage pipes placed under the streets through which surface water might find means of escaping, it results that during the rainy season each block becomes a lake of mud and slimy water, in which is deposited all refuse from the houses and stables in the block, making prolific breeding places for disease and swarms of noxious insects.

I believe that the estate has a sufficient natural drainage to dispose of a large part of the surface water if a proper effort were made to take advantage of it.

BLOCKS.

Subdivisional surveys have been completed to date in accordance with the plans of the city engineer in the case of 34 blocks of land and 13 more have been so far completed as is possible until the new streets provided for shall have been constructed.

The work in this connection consists of a resurvey and replatting of the block; the opening of numerous alleys, both longitudinal and transversal, for the accommodation of tenants living within the interior of the block; the marking of boundaries of the various holdings; the establishment of sites for public water-closets; the rearrangement of the houses to conform to the new lot and block lines; and the removal of all houses in excess of a given number to the block.

These changes have resulted in better sanitary conditions, less liability to fire, a complete abatement of disputes between tenants concerning boundaries, and the rights of way of interior tenants, and, besides increasing the revenues of the estate, have given general satisfaction to the tenants themselves.

PUBLIC WATER-CLOSETS.

There have been 24 spaces reserved for public water-closets, but only 9 have as yet been installed. These are in use and there is no doubt that they tend to improve the sanitary condition of the neighborhood.

WATER SUPPLY AND LIGHTS.

The water supply is inadequate. More than one-half of the occupied land is without water connections, the main supply extending out Calle Cervantes as far as the hospital, with branch lines extending to the right and left from this main, between Calzada de Bilibid and Calle Quiricada.

In case of a fire in the thickly settled nipa districts to the right of Calle Oroquieta, and opposite to and north of the hospital, it would be extremely difficult, if not impossible, to check the flames before the entire district would be burned, as was the case in 1903.

The electric lights are situated on Calle Cervantes between Calzada de Bilibid and the hospital (7), Calle Timbugan (4), and Calle O'Donnel (2), only 13 being placed in the entire district. The greater part of the inhabited district is without light.

FIRES.

During the past fiscal year there have been no fires of importance in the district. On the night of July 17, there was a slight fire on block No. 27, but owing to the prompt work of the fire department, and to the precautions taken by this bureau in restricting the number of buildings in the block, and the preserving of sufficient space for alleyways, through which the firemen were enabled to enter the block and fight the fire from all sides, there were only three houses totally destroyed and one partly burned.

LITIGATION.

In my last annual report, also in the one for the previous fiscal year, I referred to the suits against Messrs. Martínez, Cenjor, and Velazco. The final decisions in these cases are still pending in the Supreme Court.

The suit instituted by the Archbishop of Manila and the Franciscan Fathers, for the recovery of the San Lázaro estate, and referred to in the annual report for 1904 is still pending.

During the latter half of the past fiscal year a hearing was had of the Lucía Rizal case (also mentioned in my last report) in the court of first instance. No decision has been rendered.

During the past fiscal year it was found necessary to institute suits of ejectment against certain tenants of the estate who had become in arrears with their rent, and who would make no effort to satisfy the claims of the government. The result was very satisfactory for a time, as many of the other tenants who were in arrears promptly settled their accounts in order to avoid similar suits. But at the present time so many of the tenants having lapsed into the old habit of neglecting their payments that it will soon be necessary to institute more suits for ejectment and recovery of rents due.

Aside from the beneficial results of the ejectments as object lessons to the delinquent tenants, demonstrating that those who will not pay their rents must go, these suits usually result in a loss to the government, inasmuch as those ejected usually possess no more property than is exempted by law, and, to say nothing of the rent due, which can not be recovered, the costs of the suits have to be paid by the government. On the other hand, if suits are not brought these people continue to live on the property from year to year, without paying rent, and their influence on those who might otherwise be disposed to pay is uniformly bad, thus increasing the list of delinquents and decreasing the revenues.

Ejectment suits were also brought by the city of Manila on behalf of the bureau against certain squatters upon the estate, who had taken possession of the lands in the strong material zone and had built thereon nipa sheds, directly after the fire of 1903, in violation of its own ordinance and by permission of the municipal board, completely ignoring the protest of this bureau. These suits were satisfactorily terminated in favor of the government, the squatters were ejected, and part of the rent due collected. Some of the squatters have since taken land in other parts of the estate, or built houses of strong materials on or near the sites formerly occupied. There are still a number of squatters in this district that must be dealt with in a similar manner.

The status of the property in the Walled City, the tenants of which claim to hold same under perpetual leases, or censos, has not been determined, although on January 6, 1905, Mrs. Rafaela Pavía, widow of one Linart, one of the parties interested, filed a complaint against the Archbishop of Manila, the Franciscan Fathers, and the administrator of the San Lazaro estate, setting forth her rights under an alleged censo to redeem the property in question and secure title to the same. I understand that this suit has not been pushed and that the attorney who brought it, who is said to have done so without proper authority from the plaintiff, is now dead. In a few days the attorney-general's office will ask for its dismissal.

On February 25, 1905, Mr. W. A. Kinkaid, as attorney for the plaintiff, requested permission of the governor-general to institute this suit, and the matter being referred to this bureau the granting of this permission was recommended. Nothing further in regard to the matter has reached this bureau.

On July 20, 1905, the city of Manila began expropriation proceedings in the court of first instance for the purpose of securing blocks Nos. 17 and 20 for school sites. Assessors were appointed by the court to appraise the land and fix the amount to be paid by the city, but no notice of such appraisement has been received by this bureau.

CITY STABLES.

The city of Manila having purchased the stables and shops built by the insular purchasing agent, near the hospital, negotiations have begun looking to the settlement of the amount that the city should pay this bureau as ground rent. The city has offered ₱1,600 per year, while the actual rental value of the land is ₱2,430.48. No agreement has yet been reached.

TAXATION OF THE ESTATE.

Pursuant to the instructions from the municipal board the city assessor and collector sent to this bureau, on August 21, statements of taxes claimed to be due the city of Manila by the insular government for all property belonging to the San Lázaro estate, with the exception of the hospital buildings and inclosure, for the period from January 1, 1901, to December 31, 1905, the total amount of which is ₱166,040.35. The total amount of rent collected by the administrators of this estate since the American occupation is ₱164,849.89. All papers in the case will be transmitted for your consideration at an early date.

BILIBID PRISON.

A communication has recently reached this bureau in which the warden of Bilibid prison requests the government to cause the ejectment of all tenants of the estate occupying lands adjoining the prison reservation in order that the prison may be enlarged. If the warden's plans should be carried into effect they will result in great damage to many of the best class of tenants on the estate, who have every right to expect the government to treat them with fairness and consideration, and the effect on desirable tenants, now contemplating the building of valuable houses on vacant lands of the estate, could not but be very bad.

If the government ejects those tenants who are now, and who for a number of years have been in possession, and who have not only been permitted, but encouraged to spend their money in the permanent improvement of the lands held, the destruction and removal of which improvements would result in losses to them of perhaps several hundred thousand pesos, as well as a corresponding loss from the breaking up of their business interests, it will be almost impossible to induce prospective tenants to take the vacant lands of the estate and spend their capital in the improvement thereof.

VACANT LANDS.

There is still considerable vacant land on the estate, all of which could be rented with greater ease if the pending litigation as to the ownership of the property were settled. Owing to the suit that was instituted last year by the archbishop of Manila and the Franciscan Fathers, with a view to testing this question, no new leases can now be made, and consequently many persons who are anxious to lease the lands of the estate and desire to make valuable improvements thereon are prevented from so doing. All this results in detriment to the property and prevents it from producing the revenue that otherwise might reasonably be expected of it. Those tenants who have already built houses, relying on the good faith of the government to make leases to them as soon as it may be possible to do so, find it almost impossible either to mortgage or sell their buildings, as few persons care to acquire buildings constructed on land to the uninterrupted possession of which no guaranty can be given. It would undoubtedly be to the advantage of this property if the suit now pending should be pushed to a speedy conclusion, and unless this can be done I see no good reason to believe that the income from the property can be materially increased.

REVENUES.

During the year ending August 31, 1905, the total amount of rent received from the estate was ₱44,465.35, as against ₱31,977.84 for the preceding year.

Appropriations and expenditures.

The following is a statement of the appropriations made for and the expenditures made by the bureau during the fiscal year ending June 30, 1905:

	Appropriated Act No. 1225.	Expended.	Balance.
Salaries and wages	₱75,000.00	₱43,510.09	₱31,489.91
Contingent expenses	32,100.00	10,869.07	21,230.93
Total	107,100.00	54,379.16	52,720.84
Outstanding salary accounts and contingent expenses (estimated)			15,632.30
Balance			37,088.54

PERSONNEL OF BUREAU.

By Act No. 1225, Philippine Commission, provision was made for 51 employees in this bureau. By resolution of the Commission of June 28, 1905, further provision was made, in connection with the administration of the friar lands, for the employment of 22 others. This makes a total of 73.

There are now employed: In the Manila office—Americans, 11; Filipinos, 10; total, 21. In the field and friar lands offices—Americans, 15; Filipinos, 9; total, 24; or a grand total of 45.

That the entire number authorized by law have not been employed is owing to the difficulty of obtaining competent surveyors and clerks having a sufficient knowledge of Spanish

and English to properly handle the work in the local offices established on the friar land estates.

The difficulty in getting competent surveyors is still felt, and, in my opinion, will continue. It arises from several causes, among which are these:

(1) The reluctance of men educated as civil engineers to adopt surveying as a regular occupation.

(2) The abundance of work now easily obtained by competent engineers and surveyors in the United States, particularly in connection with railroads, the extensive irrigation systems now being inaugurated by the Government in the West, and the Panama Canal.

A much larger number of persons than those authorized to be employed have applied to me for the places created by the resolution of June 28, 1905.

According to their own statements they knew Spanish sufficiently well to make out the friar land leases in that language. Experience has shown that the most of them were greatly in error on that point.

The work now ahead of the bureau makes necessary a largely increased estimate for the year ending June 30, 1906.

I have asked for a force of 114 men, to be distributed as follows: In the Manila office—Americans, 18; Filipinos, 17; total, 35. In the field and friar lands offices—Americans, 37; Filipinos, 42; total, 79; or a grand total of 114.

This does not include laborers temporarily employed in connection with surveying parties.

The employment of the estimated force for an entire year would involve the expenditure of ₱238,856 for salaries and wages and ₱69,285.94 for contingent expenses; making a total of ₱308,141.94 or $154,070.97 United States currency.

SUGGESTIONS AND RECOMMENDATIONS.

I desire again to invite your attention to the position occupied by many men of foreign birth who have served in our Army and Navy, but who either have never taken any steps toward naturalization or have failed to complete their naturalization before coming to the Philippines. Many of these are under the erroneous impression that service in the Army, Navy, or Marine Corps makes them citizens, and numbers of them have applied to take up public lands or have located mining claims. Under the law as it now stands their applications must be rejected.

Practically all of these persons are unable to afford a trip to the United States for the purpose of complying with the law in regard to naturalization, and after years of honorable service under the United States flag they find themselves deprived of the privilege of taking up government lands in these islands.

If it be possible for Congress to devise means by which they may be naturalized here, or by which those who have taken the preliminary steps in the States may complete them here, it would be desirable that it be done.

I am aware of the fact that there are legal difficulties to be overcome, but I think the matter should be called to the attention of Congress.

I take the liberty of inviting your attention to the fact that under the provisions of section 33, chapter IV, of the public land act, applications for free patents by certain native occupants of the public domain are required to be filed by January 1, 1907.

For various reasons the people entitled to the benefits offered by this section have not generally taken advantage of it.

Its provisions do not extend to Lepanto-Bontoc, Benguet, Palawan (formerly Paragua), Nueva Vizcaya, and Moro provinces.

In view of the fact that the public land act probably can not be amended save by the affirmative action, or at least by approval, of Congress, I recommend that the attention of that body be directed to the matter, and that the period for the filing of applications under this section of the law be extended.

In view of the ignorance of the people intended to be protected by the law, and taking into consideration the difficulty of having its provisions brought to their attention, I think the period in question should be extended to January 1, 1912.

Unless the provisions of this chapter, as the law now stands, be extended to the provinces named by special resolution of the Philippine Commission, these provinces will not have had the benefits of this chapter of the public land laws which are now enjoyed by other provinces.

I am convinced that the masses of the native people are ignorant of the provisions of the public land act, and that to a large extent they will remain in ignorance of its benefits under existing conditions. The printing of this act in Spanish of course makes it available to those who know that language, but many of these belong to that class that have no interest in having the provisions of the law brought to the knowledge of those who understand only the native dialects.

I recommend that the public land act and the circulars relating to its different chapters be printed in the principal native dialects, with a view to their distribution among the great number of natives who know neither English nor Spanish.

I desire to reiterate what I have said in all my previous annual reports with regard to the necessity of a complete combined topographic and land survey.

Until this work be done there can be no accurate general mapping of the lands of the archipelago, either private or public, and as the land business of the bureau increases we shall be continually augmenting the present unsatisfactory condition arising from issuing patents for tracts of land which are not connected with any point, the geographical position of which has been determined astronomically.

I respectfully urge that some action be taken in regard to this matter as soon as possible, along the lines indicated in the report of February 6, 1904, by the committee appointed by resolution of the Philippine Commission on August 24, 1903, which report I incorporated into my annual report of last year.

The longer the matter is delayed the greater will be the difficulty in putting any general system of surveys into operation.

Section 39 of the act of Congress of July 1, 1902, in speaking of the method to be followed in deciding adverse claims in connection with applications for mineral patents, provides that the amount paid for the land shall be paid to the provincial secretary or to the collector of internal revenue of the province. Again, section 53 of the same act, relating to coal lands, provides that persons having the proper qualifications shall have the right to enter such lands upon the payment of a certain amount per hectare to the provincial treasurer or collector of internal revenue.

The revenues arising in both the above-mentioned cases are produced by the sale of portions of the public domain; they are insular funds, properly belonging to this bureau, and should be paid to it, and not to a provincial officer nor to a collector of internal-revenue taxes.

Without an amendment of these sections of the act of Congress, or further legislation by the Commission, obliging the officials now authorized to receive these funds to report their receipt to this bureau, it is impossible that the latter should be able to keep proper records showing the proceeds arising from the sources of revenue referred to.

I invite your attention to the matter in the hope that the present condition may be changed, so that this bureau may be given entire control of the funds produced by the alienation of all lands under its jurisdiction.

CONCLUSION.

Because of the impossibility of obtaining competent men for field work as rapidly as the increased business demanded them, this bureau, during the past year, has been compelled upon a number of occasions to ask the bureau of engineering, the mining bureau, and the bureau of agriculture to aid it by detailing employees of those bureaus for temporary service under my orders. I desire to acknowledge the indebtedness of this bureau to the chiefs of the bureaus mentioned for the assistance thus given and to testify to the satisfactory character of the services rendered by the employees so detailed.

The general character of the work done by my own employees has been good and in the cases of not a few has been of a high character. It is a pleasure to me to acknowledge my obligation to them and especially to those who have cheerfully and voluntarily done much overtime work.

Respectfully submitted.

WILL M. TIPTON,
Chief Bureau of Public Lands.

The SECRETARY OF THE INTERIOR,
Manila, P. I.

APPENDIX L.

REPORT OF THE PHILIPPINE WEATHER BUREAU.

PHILIPPINE WEATHER BUREAU,
Manila Observatory, September 15, 1905.

SIR: The Rev. José Algué, director of this bureau, having left the Philippine Islands on July 11 in order to—while enjoying his accrued leave of absence—observe in Spain the total eclipse of the sun on August 30, and to represent the Philippine weather bureau at the international congress of meteorologists, to be celebrated at Innsbruck, Austria, in September, the duty of presenting to you the annual report on the work of the Philippine weather bureau during the year ended August 31, 1905, devolved upon me, as the acting director.

The information to be given can best be grouped under the three principal headings, Manila Central Observatory, secondary stations, and difficulties and plans.

I.—MANILA CENTRAL OBSERVATORY.

In treating of the Central Observatory we may conveniently consider: (1) The work of the various departments; (2) the improvements made during the past year; (3) the publications issued by the bureau.

1. THE DEPARTMENTS OF THE CENTRAL OBSERVATORY.

Manila Central Observatory comprises five different departments—meteorological, astronomical, seismic, magnetic, and mechanic.

(*a*) *The meteorological department.*—The work of the meteorological department—by far the most important from a practical point of view—takes up most of the time and energy of the personnel of the weather bureau. Still, little can be said of it, since 95 per cent thereof is routine work—constant watching of the instruments, collecting data furnished by the observers at secondary stations, examination of the reports, comparisons, and compilations. Even the bulletins and annual reports give an adequate idea of the work involved only to those who know what amount of labor is usually hidden in a dry, simple-enough-looking "table."

The time for direct hourly observations has been extended, being now from 6 a. m. to 7 p. m. daily, Sundays and holidays included. Although an effort is made to compensate the employees for the overtime thus given, there is still a total balance of 1,087 hours in their favor. Owing to the fact that the members of the staff reside on the premises of the observatory, they are practically always on duty. Callers who come on business are never put off to a more convenient time. Even those who merely desire to see the institution are invariably received at any time, if feasible, and in fact almost as many call after office hours and on Sundays as do during the hours of official duty.

That the quality of the work has not become worse is amply proven by the implicit confidence of the shipping interests, not only of the archipelago, but of the whole Far East. Even from as far west as Singapore telegraphic queries have been received.

Besides the ordinary daily dispatches to China, Formosa, and Japan, 18 special typhoon warnings have been issued to foreign centers during the period under consideration, each of them having been forwarded to Haiphong, Hongkong, Shanghai, Taihoku, and Tokio. Of course no warnings are given in cases in which the disturbance when discovered is already nearer to one of these centers than to Manila, as, for instance, storms coming from the interior of China, as it is then the duty of such observatory to report same.

As to the accuracy of these informations we confidently refer the reader to the monthly bulletin, in which their texts are given and compared with the announcements issued by Hongkong Observatory.

In the meteorological department instruments sent for this purpose are compared and certificates of comparison issued gratis. No use has been made of this facility, except for barometers. Of these, 113 have been observed for varying periods and, when necessary, corrected so as to reduce their mean errors as nearly as possible to zero. Some of these instruments belonged to private persons, but the great bulk was sent by various bureaus of the insular government and by Manila dealers.

For the convenience of those mariners who wish to compare their barometers without sending them to the observatory, the barometer readings for 4 p. m. of the preceding and

for 10 a. m. of the same day (corrected for temperature and reduced to sea level) are published daily, together with the weather note. This improvement is due to a suggestion made by Mr. Putnam, Coast and Geodetic Survey.

Special meteorological information had on several occasions to be compiled and furnished at the request of various government officials and bureaus.

(*b*) *The astronomical department.*—Owing to the fact that original research in astronomy does not fall within the scope of a weather bureau and that, consequently, the members of the staff can not devote their time to this kind of work, the magnificent equipment of Manila Astronomical Observatory could not be utilized. It is, however, confidently hoped that we shall be able to secure an astronomer, who, unhampered by official duties, will be in a position to devote himself entirely to astronomy. Also some structural features of the cupola, which now interfere with expeditious work, will be changed when circumstances permit. Hitherto more pressing needs have prevented such improvements.

This department is not open to visitors after nightfall. However, on several occasions very distinguished personages, including Admiral Stirling and family, Mrs. Corbin, the honorable secretary of the interior and Mrs. Worcester, the chief quartermaster of the Philippine Division and Mrs. Clem, etc., have been welcomed by special appointment.

Thus far nearly all the work of this department has been in connection with the official time service and the furnishing of astronomical data to parties applying for them. As in former years, the correct time has been determined from star transits and daily telegraphed at 11 a. m. mean time of the one hundred and twentieth meridian east of Greenwich to all telegraph stations in the islands, while to the shipping in port the time is signaled at 12 noon by means of the time ball. An arrangement has been made with the Daily Bulletin of Manila, according to which this paper is to be immediately informed whenever the error in dropping the ball exceeds half a second. The correction is then printed in the next issue of the paper. Thus far it happened only once.

A 4-inch telescope has been regularly employed in the study of sun spots, of which a sketch has been made whenever possible, the object being to trace the relations between sun spots and magnetic disturbances.

Two curious accidents happened to our timepieces. The earthquake of January 27, 1905, stopped all our pendulum clocks except the sidereal clock and the new "Riefler" mean time clock, of which latter an account will be given under No. 2 (*a*). As was to be expected, the shock did not affect the numerous chronometers to any extent. But their time came in April. From the 7th to the 9th of said month all the chronometers in the observatory—and, as we have been informed, the 14 chronometers in the bureau of equipment, naval station, Cavite, as well—made a most puzzling run. The only explanation which has offered itself assigns as cause the abnormal changes of meteorological conditions at that time. But this explanation is not quite satisfactory. Transit observations showed that the clocks had kept a steady pace.

As provided by Act No. 131 of the honorable Philippine Commission, chromometers are rated free of charge at Manila Observatory. Twenty-nine have thus been observed for periods ranging from two days to two months. Periods of one to two months make it appear that some parties consider the Observatory a convenient place of storage for spare chronometers, which relieves them of the trouble of winding them, etc. Of course, matters are different with captains who go on a voyage and hence can not call for their timepiece until after their return.

Three times the Observatory has been called upon to record the time signals sent by the United States Naval Observatory to every part of the globe in celebration of some event. Of the first time, September 9, 1904, no records have been preserved. The second time the signals were sent at Washington midnight of New Year's Eve, 1904–5 (mean time of the seventy-fifth meridian west of Greenwich). Owing to the difference in longitude, they arrived here January 1, 1905, at 1 p. m. Out of 40 signals 10 were accurately timed by means of a fine chronometer belonging to the observatory, and the average time of transmission was found to have been 0.3 seconds. These proceedings are an exceedingly interesting illustration of the rapidity with which, under specially arranged conditions, information could be communicated to the farthest corners of the world; but for purposes requiring mathematical precision, e. g., for testing longitude determinations or the accuracy of a time service, they are without any value. This is due to the necessity of repeating by hand the signals originally emanating from the transmitting clock of the United States Naval Observatory, since the apparatus employed on submarine cables does not permit of repetition by automatic relay. In the case of transmission from Washington to Manila the signals have to be repeated by human agency at San Francisco, Honolulu, Midway Island, and Guam, thus introducing four unknown and irregularly varying factors, viz, the "personal equations" of the operators.

The extent to which these sources of errors may affect the time of transmission was strikingly manifested on May 4, 1905. At Washington, midnight, May 3–4, the experiment of sending the time signals was repeated in honor of the International Railway Congress, which was to meet at the National Capital on May 4. On this occasion two observers were

taken to the Manila cable station. To prevent mutual dependency they were given chronometers with widely different corrections. Nevertheless, final reduction showed that their average differences in recording the signals were only 0.025 second. Of the accuracy of the observations there can, consequently, be no reasonable doubt. The intention was to record every thirtieth and sixtieth second of the 5 minutes, $11^h\ 55^m\ 00^s$ to $12^h\ 00^m\ 00^s$, Washington time. The first signal, however, was received at $12^h\ 55^m\ 52^s$, and evidently wrong. The signal corresponding to $11^h\ 56^m\ 30^s$ arrived three seconds late, and then the error increased irregularly, making the mean of the seven pairs of observations used in the reduction —10.77 seconds. The last, midnight signal, was missed by both observers, but measurement of the cable tape shows that its recording would not have affected the final result favorably. The explanation is simple enough—the strain of having to watch and repeat the second beats for fully 5 minutes was too severe for the operators.

(*c*) *The seismic department.*—All stations of the weather bureau of Classes I–III (except the newly established station on Guam) are equipped with seismic pendulums and instructed in case of earthquakes to add a fifth group of figures to their next telegraphic report, which gives the necessary data. The registered curves and a full report is to be sent by mail. Thus a clear idea of the frequency of seismic shocks in the archipelago, of their character and extent can be formed. A résumé is inserted in the bulletin for the corresponding month. Of the more marked cases a report was also given to the Manila press.

The Central Observatory is equipped with a Vicentini microseismograph and six other instruments which register only stronger shocks. The former is so sensitive that no earthquake severe enough to cause heavy damages can occur anywhere on the globe without leaving its traces on the record. Thus, on April 4, 1905, at $8^h\ 58^m\ 25^s$ p. m., the instrument began to indicate a very distant violent earthquake. Very soon the daily papers were filled with the accounts of the frightful havoc which this earthquake had wrought in British India. I have the honor of inclosing a reduced photograph of the most interesting part of the record traced by the terrible phenomenon at Manila at a distance of about 3,200 miles from the center of the disturbance. (Pl. I, *A*.) A full discussion of this record may be found in the Monthly Bulletin for April, 1905. July 9, 1905, at 5.40 p. m., another far-distant earthquake affected the apparatus. As the tracings which resulted on this occasion show the curves characteristic of far-distant disturbances even clearer than those of the Indian catastrophe, part of it is reproduced on Pl. I, *B*. This earthquake occurred either under midocean or in a deserted region or was not very violent, as no reports of destructions appeared in the daily press.

For the sake of comparison I also submit a photograph of the record made by a local earthquake and another at moderate distance. The former had its center, probably, near the Zambales range of mountains and considerably terrified a great part of Manila's inhabitants at $8^h\ 53^m\ 40^s$ p. m. of January 27, 1905, without, however, doing any other harm, as it was of moderate intensity. (Pl. II, *A*.) The latter (Pl. II, *B*) shook the east coast of Sámar at 7.04 a. m. of December 10, 1904. This record is one of the prettiest on file. Attention is especially drawn to the unusually large vertical component (*a*) and to the fact that it was registered in full strength a considerable time before the horizontal movements were fully developed.

During the present year there will be installed at the observatory a new microseismograph of the Vicentini type rendered still more sensitive by some improvements introduced into it by the director of the weather bureau. This instrument is the work of our mechanics and has been on exhibition at the World's Fair, St. Louis, Mo.

According to an agreement with the "Central-Stelle für Erdbebenforschung" (Central Bureau for the Investigation of Earthquakes) at Hamburg, said institution has regularly been accommodated with manuscript reports, as the bulletin appears too late for the purposes of said bureau.

(*d*) *The magnetic department.*—The stables of the land-transportation corral, which, with their shifting masses of iron in close proximity to the magnetic observatory, proved so much of a nuisance, have been removed. There has, indeed, been installed a quantity of machinery in the trade school, which is on the same grounds, but its disturbing effect dwindles into insignificance when compared with the influence of a new factor introduced on April 8, 1905. The electric street railway marks the beginning of a new era for Manila. It also marks the close of the career of the magnetic observatory, at least to a great extent. Observations will, indeed, be continued for some time, as some interesting results are hoped for; but the time for those delicate measurements formerly made is a matter of the past—a small loss in comparison with the general and practical utility of the new system of transportation, but sufficiently severe from a scientific point of view.

As it is presumably of considerable interest to see the influence of the electric cars on the magnetic instruments, I have the honor of presenting reduced photographs of some of the

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NOTE.—The plates referred to above are on file in the office of the Bureau of Insular Affairs, War Department.

photographic records. Since each sheet contains the tracings of two days, I beg to say that the curves belonging together have been marked by the same letter. Thus, for instance, curves *a* on the upper half of Pl. III give the magnetic record for the period from 8 a. m. March 25 to 8 a. m. March 26, while those marked *b* extend from the latter date to 8 a. m., March 27; *a* and *b* representing the magnetic declination, *a'* and *b'* the vertical, and *a''* and *b''* the horizontal component of the magnetic force. The straight lines underneath each of these curves are the base lines from which the former are measured.

Pl. III, *A*, is the record of almost complete magnetic calm. The displacement of the vertical component *a'* and *b'* during the hours between 6.20 p. m. and 5.15 a. m. is the effect of the electric current feeding the arc lights on the neighboring streets.

On Pl. III, *B*, the curves *a*, corresponding to April 4–5, show the magnets slightly agitated, but the principal interest attaches to the curves *b*. During the hours from 10 p. m. of April 5 to 5 a. m. of April 6 the electric railway was tested by running a car from the stables via Calle San Marcelino to Santa Ana and back. Curves *b* exhibit the effect which the experiment had on the magnetographs.

Pl. IV, *A* and *B*, give an idea of the magnetic conditions since the electric cars are running regularly, *A* containing the records of two days on which they were still confined to streets which do not approach the observatory closer than 540 meters, while *B* shows the effect of the system in full operation, the minimum distance at which cars pass being 200 meters. The short stretches of smoot lines correspond to the hours from midnight to 5 a. m., when no cars are running. The curious displacement of curve *b'* is due to an accident to the corresponding magnet.

Pl. V is intended to demonstrate the essential difference between the effects of the trolley cars and those produced by disturbances of the terrestrial magnetism. The upper half of the plate shows the more interesting part of the magnetic storm which occurred in the beginning of February, 1905, while the lower half reproduces the tracings made by the disturbance of March 31 to April 2, 1905.

In concluding the report on the magnetic department I beg to say that the removal of the instruments to some other station is contemplated. Baguio and Zamboanga have been considered, but nothing definite can as yet be said.

(*e*) *The mechanics' department.*—After Mr. Román Trinidad had returned from St. Louis in January, 1905, the central office had again, after more than a year, its full complement of mechanics. With the great number of instruments at the Central Observatory to look after, even on Sundays and holidays, and the repairs required by over fifty secondary stations, it is clear that there is always plenty of work, especially in a climate like ours, leaving little time for new constructions. Moreover, the demands for courtesies made by other insular bureaus have been somewhat frequent. Still they can not be refused, since such action would generally mean the heavy expenses of sending the instruments abroad—which ultimately would have to be borne by the same government that pays our mechanics—not to mention the endless delays resulting; wherefore these requests have always been complied with most cheerfully. To mention only one instance, October 13, 1904, Doctor Thomas telegraphed from the civil sanatorium at Baguio to the superintendent of the government laboratories: "Is there a place this side of United States where we can have torsion balance mended?"

Doctor Freer referred the matter to the director of the weather bureau, who replied by asking that the apparatus be sent to the observatory, where it was effectually repaired. All kinds of instruments have thus been treated, aneroid barometers, in which the vacuum had been destroyed, and chronometers being about the only pieces of apparatus which baffled the skill of our mechanics. Of course, no charges were made for such work; only the actual expenses for material, where such had been incurred, had to be refunded. No repairs were executed for private persons, except the correction of numerous aneroids, which were found to indicate wrongly, their adjustment being part of the service which the bureau owes the public and requiring only a few minutes per instrument.

THE CROP SERVICE.

1. *General remarks.*—Although the crop service is not a department distinct from the meteorological department, but rather an appendix thereto, I consider myself justified to speak of it separately. This service has been carried on during the past year in precisely the same manner as in preceding years—under the same difficulties, viz, supreme indifference of many who might have given valuable information, and, consequently, with the same incomplete results. A document bearing upon the plan of a new system of crop reporting will be found under III, 2; but the matter is as yet hardly ripe for final action by the authorities.

NOTE.—The plates referred to above are on file in the office of the Bureau of Insular Affairs, War Department.

2. *Entomological work.*—I beg to lay before you the results achieved in a line of work closely connected with the crop service, which hitherto have never been embodied in the annual report, viz, in the study of insects injurious or beneficial to agricultural interests in the Philippines.

In the bulletin for January, 1903, Fr. William A. Stanton, then assistant director of the weather bureau, commenced a series of articles on these insects, to the study of which he devoted all his spare time, with the enthusiasm of the true scientist. When he left the islands, Fr. R. Brown, who, though not on the staff of the bureau, has given valuable aid to the same for the last three years, and who had already done considerable work along those lines, continued these articles up to the present time. Although these researches had to be confined to a small area in the immediate vicinity of Manila, chiefly to the garden of the observatory, they have had scientific results far beyond expectations, vastly increasing our knowledge of the Philippine insect world. The following discoveries have been made:

A. By Rev. William A. Stanton, S. J.

Superfamily Apoidia.—Family *Ceratinidæ*, 1 new species. Family *Stelididæ*, one new species. Family *Andrenidæ*, one new genus and 1 new species. Two other new species belonging to different genera. Family *Prosopidæ*, 1 new species.

Superfamily Sphecoidea.—Family *Crabonidæ*, 2 new species belonging to different genera. Family *Larridæ*, 1 new genus and 2 new species. Family *Trypoxylidæ*, 1 new species. Family *Mellinidæ*, 1 new species. The first species of this family recorded from the Philippines.

Superfamily Vespoidea.—Family *Ceropalidæ*, 1 new species. Family *Chrysididæ*, 1 new species. Family *Bethylidæ*, 3 new species. The first to be recorded from the Philippines. Family *Scoliidæ*, 1 new species. Family *Mutillidæ*, 1 new species.

Superfamily Proctotrypoidea.—Family *Ceraphroniidæ*, 1 new species, the first from the Philippines. Family *Scelionidæ*, 1 new species.

Superfamily Chalcidoidea.—Family *Chalcididæ*, 4 new species. Family *Eurytomidæ*, 1 new species. Family *Encyrtidæ*, 1 new genus, dedicated to the Hon. W. Taft, under the name Taftia. Another new genus, "Exoristobia,"5 new species. Family *Eulophidæ*, 5 new species.

Superfamily Ichneumoniodea.—Family *Evaniidæ*, 1 new species. Family *Ichneumonidæ*, 13 new species. Family *Braconidæ*, 1 new genus, "Stantonia," 17 new species. Total, 5 new genera; 67 new species.

B. By Rev. Robert Brown, S. J.

SUBORDER I.—HETEROPHAGA.

Superfamily Apoidea.—Family *Ceratinidæ*, 5 new species. Family *Stelididæ*, 2 new species.

Superfamily Sphecoidea.—Family *Larridæ*, 3 new species. Family *Trypoxylidæ*, 2 new species.

Superfamily Vespoidea.—Family *Ceropalidæ*, 1 new species. Family *Vespidæ*, 1 new species. Family *Eumenidæ*, 2 new species.

Superfamily Proctotrypoidea.—Family *Belytidæ*, 3 new species. The first to be recorded from the Philippines. Family *Diapriidæ*, 1 new species. The first ever recorded from these islands. Family *Ceraphronidæ*, 2 new species. Likewise the first to be recorded. Family *Scelionidæ*, 4 new species. Family *Platygasteridæ*, 1 new species. The first representative of the entire family ever found in the Philippines. Family *Figitidæ*, 4 new species. The first from the archipelago.

Superfamily Chalcidoidea.—Family *Chalcididæ*, 1 new species. The first of its genus found in the islands, and 4 other new species. Family *Agaonidæ*, 1 new species. This species and the 3 of the next following family are the first fig insects ever recorded from the Philippines. Family *Torymidæ*, 3 new species. Family *Eurytomidæ*, 2 new species. Family *Encyrtidæ*, 1 new genus, "Apterincyrtus," and 4 new species. Family *Eulophidæ*, 1 new genus, "Nesolynx," and 4 new species. Family *Trichogrammidæ*, 1 new species. The first representative of the family from these islands.

Superfamily Ichneumonoidea.—Family *Ichneumonidæ*, 1 new tribe, "Nesomesochorini," 2 new genera, and 14 new species. One of these species is the first, not only from these islands, but from Asia. Family *Alysiidæ*, 2 new species. The first from the Philippines. Family *Braconidæ*, 1 new genus, "Brownius," and 21 new species.

SUBORDER II.—PHYTOPHAGA.

Superfamily Tenthredinoidea.—Family *Xyelidæ*, 1 new species. The first from these islands. Family *Selandriidæ*, 1 new species. Total, 1 new tribe; 5 new genera; 86 new species.

The accuracy of the classification is above suspicion, as it has been made by no less an authority than Dr. William H. Ashmead, of the National Museum, Washington, D. C., to whom the specimens were sent for the purpose, Manila not offering the facilities required for such work.

2. Improvements of Manila Observatory.

The past year has witnessed several, some of them rather costly, improvements of the Central Observatory. These did, however, not entail any expenses to the insular government, since they were paid for from the private resources of the observatory.

(*a*) The most important of these improvements is probably the new astronomical clock for mean time, by the firm Clemens Riefler, of Munich, Bavaria, which is universally acknowledged the best clock maker of the present. The clock furnished to Manila observatory is No. 42, type "E"—that is, it is an astronomical clock inclosed in an air-tight glass cylinder, within which the atmospheric pressure may be reduced to any desired amount by means of an air pump. The clock has a perfectly free echappment, compensating nickel-steel pendulum, is wound electrically every 29-30 seconds, and is provided with two electric "second contacts." One of these is for use with the chronograph; the other may be utilized for driving secondary electric clocks, or better still, for synchronizing ordinary pendulum clocks with the standard clock of the observatory. This additional contact has been ordered introduced in view of the possibility that the government may some day desire to have certain public offices continuously provided with the exact time. Within the glass cylinder mentioned as enclosing the clock, are mounted a barometer, thermometer, hygrometer, and microscope—the latter for observing the amplitude of oscillation of the pendulum. The air pump furnishes an additional means for effecting most delicate corrections, by slightly increasing or decreasing the pressure within the cylinder. The clockwork is gilt and fully jeweled. Pl. V gives an idea of this timepiece as mounted on the ground floor of the astronomical observatory. The space to the left is reserved for a second clock of the same type, but indicating sidereal time, while the one already mounted is destined to be the "standard" meantime clock of the archipelago.

As will be readily understood from the foregoing description, this clock runs under practically constant air pressure. In order to secure an approach toward constant temperature, or at least to insure small and slow changes, the same has been housed, as is shown on Pl. VI. There is first the outer wall of the building, then a circular wall (a), 1 meter thick and having only one door and four small windows, all of which lead into other apartments. From the solid masonry pier (b), 3 by 3 meters, to which the clock is fastened, brick walls (c) were extended to meet the circular wall, and in the compartment thus formed a case was erected, having plate-glass front and sides, shielding the clock still further against sudden changes of temperature.

Lack of time has, unfortunately, made it hitherto impossible to undertake the long and laborious task of a thorough study of the clock, but it is confidently expected that it will give excellent results.

The cost of this clock, exclusive of the heavy expenses of installation, is $700.

(*b*) For the photographic work occasioned by the entomological studies and for other purposes a thoroughly up-to-date photographic camera has been acquired by the observatory: price, including freight from Rochester, N. Y., to Manila, nearly $500. This instrument is a long-focus camera, with 47 inches draw, is equipped with 5 Bausch & Lomb double anastigmats ranging in focal length from 4⅜ to 23½ inches, with volute and focal-plane shutters, with telephoto attachment—in short, with everything required for any kind of work up to 8 by 10 inches except the three-color process.

(*c*) A small but excellent chronometer has recently been purchased at the price of $157.50.

(*d*) Four small electric motors, to be run on the Manila electric-light circuit, have been imported from America for various purposes, such as running the lathe in the mechanics' shop, charging storage batteries (motor and direct-current dynamo combined), etc. But since the Manila Electric Railway Company has decided to radically change the character of the current these motors represent hardly more than so much money wasted.

(*e*) The mechanics' shop has been equipped with a first-class lathe for working metal and with many new tools.

(*f*) The two steel towers which flanked the station building of the Philippine weather bureau at the World's Fair, St. Louis, Mo., have been erected on the grounds of the observatory. (See Pl. VII.) They serve both a scientific and an economical purpose. For the former two copper wires have been stretched between them, well insulated, from the steel structures. These are the "collectors"—in wireless telegraphy they would be called "antenna"—for the magneto-electric waves sent up by the disruptive discharges of electricity commonly called lightning. Each of these two wires leads to one of the two "Ceraunographs" (lightning recorders) which have been installed in the building of the

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magnetic observatory. These lightning recorders are shown on Pl. VIII, *A* being the instrument invented by Reverend Fenyi, S. J., of Kalocsa, Hungary, and *B* that invented by Reverend Odenbach, S. J., of Cleveland, Ohio.

For economical purposes both towers carry water tanks of 6 cubic meters capacity each, which are filled from a well by means of a pump driven by the air motor which is seen to surmount the tower on the right. These tanks furnish water under more than sufficient pressure for flushing the closets of the weather bureau, which hitherto were a nuisance, owing to the fact that during the day the city mains hardly ever carry sufficient pressure to raise the water to the second floor of the building. The tower to the left will probably be utilized for a second air motor driving a small dynamo wherewith to charge storage batteries, thus reducing expenses for materials consumed in primary cells.

(*g*) All the cement walks on the grounds occupied by the observatory proper have been relaid during the last year. They cover a total area of 1,145 square meters and represent $1,500.

It thus appears that of the aggregate salary of the five members of the staff of the weather bureau, amounting to $9,300, nearly one-third, that is, more than $3,000, has been expended in improving the central office.

3. Publications.

(*a*) *Ordinary publications.*—The Monthly Bulletin has been continued along the same lines as during preceding years. Toward the middle of 1904 (that is, of the bulletins referring to said period) the demands became greater than the supply, but it was not deemed advisable to increase the edition until the beginning of a new volume, January, 1905, when 150 copies were added, making the present edition 1,150 copies. As several numbers were completely out of print even before the bulletin for December, 1904, had appeared, we called in all the numbers remaining over at the stations and distributed, together with the bulletin for January, 1905, a notice requesting parties who do not intend to preserve their copies of 1904 and preceding years to kindly return them to the central office. A few complete volumes could thus be made up of the copies returned.

It is much to be regretted that the bulletin appears so late. This is due partly to the fact that the monthly reports of of some stations can not reach the central office until four to six weeks after the close of the corresponding month, partly to the delays which it experiences at the government printing office—as many as three numbers having at one time been in the hands of the public printer. This latter fact seems to be owing more to the great amount of work considered to be more urgent than the printing of the bulletin than to any circumstances under control of the printer, because since the former has somewhat diminished the bulletin has been printed with commendable rapidity.

Of the Annual Report for 1903 Parts I and II have been distributed; the manuscript for Part III is in the hands of the printer.

Numerous requests for complete sets of the publications of the weather bureau have of late been received. All that was possible has been done to satisfy these demands, but to furnish "complete sets" is an impossibility, since a considerable number of publications are out of print.

(*b*) *Special publications.*—No special reports, etc., have been printed during the past year. But in compliance with your instruction I beg to report on the distribution of the special report entitled "The Cyclones of the Far East" which was made during this year. From the 1,993 copies received the following distributions were made:

	Copies.
Bureau of Insular Affairs, Washington, D. C.	25
United States Navy	183
United States Army	32
Bureau of coast guard and transportation	29
Weather bureau, central office and stations	14
Various insular bureaus	15
Secretaries of navy of foreign countries	18
American scientific centers	30
Foreign scientific centers	156
American scientific societies	8
Foreign scientific societies	24
American scientific and professional press	5
Foreign scientific press	35
Prominent American scientists	8
Prominent foreign scientists	12
Leading American libraries	31
Foreign libraries	4

Note.—Plate referred to above is on file in the office of the Bureau of Insular Affairs, War Department.

	Copies.
Shipping firms and ships' officers	37
Chambers of commerce and managers of cable companies	9
Various persons named in distributing lists	18
The author	300
Total	993

As several parties applied for the expensive book who were not entitled to receive it free (for instance, booksellers), and on the other hand there was no provision for the sale of it, the director suggested that such provision be made, which was actually done by the honorable Philippine Commission June 23, 1905, in the following resolution:

"*Resolved*, That the disbursing officer of the Philippine weather bureau be authorized to sell at the price of 6 pesos per volume the publication of which the director of the Philippine weather bureau is the author and which is entitled 'Cyclones of the Far East,' the proceeds of such volumes to be covered into the treasury as miscellaneous receipts."

The price established is very moderate. If the book were a commercial venture it would cost 8 to 10 pesos.

Relatively few reviews of the book have thus far come to our hands, but every one of them speaks highly of the work. Permit me to give a few specimens, with the assurance that no adverse comment is being omitted.

Symons's Meteorological Magazine (No. 472, May, 1905, p. 69):

"The learned director of the Philippine weather bureau has written so complete and detailed a treatise on the whole subject of tropical cyclones, and especially of the terrible typhoons which are of constant occurrence in the neighborhood of the Philippines and of the China Sea, that any attempt to make a synopsis of the work would be an impossibility in the limited space at our disposal.

"After describing at length the origin, structure, movements, and laws of typhoons and discussing their frequency and classification, the author gives an account of the attendant phenomena, meteorological and otherwise, and various direct and indirect precursory signs of their occurrence.

"In the latter part of the volume typical typhoons are minutely described as confirmatory evidence of the information given in the earlier part. There are also a number of notes of practical interest to sailors and a list of harbors which afford refuge in case of an encounter with a typhoon. The volume is profusely illustrated with maps, diagrams, and photographs of instruments.

"Taken altogether this is an able compendium of the life work of an acknowledged master of the subject, and takes its place as a standard work on tropical meteorology."

In "Petermann's Geographische Mitteilungen" (Heft II, 1905; Literaturbericht, Allgemeines, Nr. 43) Prof. E. Knipping gives a summary of the work and then continues:

"This brief synopsis of its contents shows that the work treats fully of everything which has any connection with cyclones. It would be difficult to find any point which is not thoroughly discussed. It is planned on a grand scale, all possible points of view, especially the precursory signs, are very exhaustively treated and the principal results are then collected in a résumé for the mariner. For our purpose it must suffice to select a few points from the abundance of material."

The reviewer then mentions several particulars. The only point in which he does not agree with the author is the latter's assumption that a shipmaster can ascertain the bearing of a storm center to "within a few divisions of the compass." The only flaw he found is the fact that on page 218, line 2 from above, occurs the expression "south by southeast," which he rightly maintains should read "southeast by south." He concludes:

"The work has evidently been corrected with painstaking care, as this is the only point of this kind which I noticed. The typographical work of the book, the clear type, and its perspicuous arrangement, together with copious illustrations, is equally excellent as the contents. The fact that this second edition appeared in English ought certainly to facilitate its becoming known. The references are very comprehensive and take also the older literature into consideration."

The Allgemeine Schiffahrts Zeitung (IX year, No. 11, p. 282) concludes its review of the book thus:

"The author who, being director of the Philippine weather bureau, is doubtless the person best qualified to publish a work of this kind, has set himself a task which also from the point of view of the shipping interests is deserving of recognition in an extraordinary degree. We trust that the book will find in the circles interested in oriental shipping that attention which on account of its scientific and practical value it so richly deserves."

Prof. Robert de C. Ward, of Harvard University, sums up his remarks in the Bulletin of the American Geographical Society (Vol. XXXVI, No. 11, Nov. 1904), as follows:

"Taken altogether, 'The Cyclones of the Far East' is a work which will be indispensable to all students of meteorology who go beyond the very limited discussion of the ordinary

text-book, and especially to mariners of all nations whose business takes them into those seas of the Far East, which are the home of the dreaded typhoon."

In Nature (London, vol. 71, No. 1835) the reviewer, who signs "C. H.," has this to say of the general character of the work:

"Commendation should certainly be given of the careful arrangement and division of the whole work, which aid much the general study and grip of the valuable material, while numerous illustrations add much to the elucidation of the subject. Father Algué must be credited with what is only too commonly overlooked. At the conclusion of each chapter reference is given to the works which may be consulted in connection with the branch of the subject dealt with. The references appear to have been chosen with the greatest impartiality and with the sole desire to render the work as complete as possible. This example may commend itself to authors of other branches of scienitfic work. * * *"

A few more reviews have been received, among them those which appeared in the American Journal of Science, in Science, all in the same strain; except the enthusiastic article by the editor of the Hongkong Daily Press (October 6, 1904), which concludes:

"It (the book) is manifestly exhaustive, manifestly able, and save that it is by no means a 'popular' work, we should expect its publication to be hailed with the acclamation deserved by a real 'magnum opus.'"

These quotations may suffice to show that "The Cyclones of the Far East" have not brought any discredit upon the Philippine government, under whose auspices the work has been published and in whose name it has been presented to the scientific world.

Appendix.—Roster of Manila observatory.

In order to give an idea of the fidelity of the personnel of the meteorological service, I take the liberty of adding the roster of Manila observatory, calling special attention to the column "Connected with the Philippine meteorological service." There are a few other employees with similar records of long service stationed at secondary stations:

Name.	Position.	Salary.	Connected with Philippine meteorological service.	Appointed to Philippine weather bureau.
José Algué	Director	$2,500	Since 1894	May 22, 1901
M. Saderra Mata	Assistant director	1,800	1888–1894, 1901–1902, since Oct. 1903.	Mar. 1, 1904
M. Saderra Masó	....do	1,800	1890–1896	Sept. 1, 1901
James L. McGeary	....do	1,800		Aug. 3, 1904
George M. Zwack	Secretary and librarian	1,400	Since May, 1903	Oct. 9, 1903
Robert E. Brown			Since Sept. 1902	Volunteer.
Cesáreo Jovellanos	First-class observer	900	Since 1882	May 22, 1901
Cesáreo Dulueña	....do	900	Since 1890	Do.
Alejandro Anareta	....do	900	1892 - 1894, since 1896.	Do.
Pedro Baltasar	Telegrapher	900		July, 1, 1901
Leopoldo Arcopagita	Calculator	720	Since 1896	May 22, 1901
José P. Borja	....do	720	1892 - 1903, since 1899.	Do.
Gervasio de Guia	....do	720	1894 - 1896, since 1899.	Do.
Bartolomé de León	Assistant observer	600	Since 1900	Do.
José Javier	....do	600	1892 - 1894, since 1898.	Do.
C. Francisco	Assistant librarian	600	Since 1896	Do.
Alfredo Zamora	Assistant calculator	300		Dec. 15, 1901
P. Resurrección	....do	300		Apr. 1, 1905
Ramón Navarro	First-class draftsman	720	Since 1899	May 22, 1901
Emiliano Layoc	Second-class draftsman	600	Since 1895	Do.
Cesáreo Ubaldo	Chief mechanic	720	Since 1886	Do.
Román Trinidad	First assistant mechanic	600	Since 1899	Do.
Ramón Benitez	Second assistant mechanic	420	Since 1899	Do.
Basilio Lindo	Third assistant mechanic	300	1888 - 1896, since 1899.	Do.
Miguel de la Cruz	Janitor	150	Since 1896	Do.
Segundo Susano	....do	150	Since 1899	Do.
Maximino Venicario	Messenger	150		Do.
Gregorio Yuse	....do	150		June 1, 1905
Valeriano García	General work	150	Since 1897	Paid by observatory.

II.—SECONDARY STATIONS.

1. Stations in operation, August 31, 1905.

The stations of the Philippine weather bureau are of two kinds—official and voluntary. The former are served by paid observers, except the third-class station at Catbalogan, while in regard to the latter it is usually a case of lending meteorological instruments to some officer of the insular government or of the U. S. Army under the expressed condition that the weather bureau be furnished with a copy of the observations.

(a) Official stations of the Philippine weather bureau.

Station.	Province.	Latitude, north.	Longitude, east.	Class.	Observer.
		° ′	° ′		
Santo Domingo	Batanes Island	20 28	121 59	Second	Pío Marmoril.
Aparri	Cagayán, Luzón	18 22	121 34	First	Manuel Delgado.
Tuguegarao	do	17 35	121 39	Third	J. C. de León.
Vigan	Ilocos Sur, Luzón	17 34	120 23	Second	Antonio Centeno.
Candón	do	17 12	120 26	Third	Luis Quiamorio.
San Fernando	Unión, Luzón	16 37	120 18	do	Ovidio Centeno.
Baguio	Benguet, Luzón	16 35	120 43	do	Gregorio Galvan.
Bolinao	Zambales, Luzón	16 24	119 53	Second	Juan Santos.
Dagupan	Pangasinán, Luzón	16 3	120 20	First	Toribio Jovellanos.
Baler	Príncipe, Luzón	15 47	121 34	Fourth	A. Brousseau.
Masinloc	Zambales, Luzón	15 34	119 56	do	Manuel Minaya.
Tárlac	Tárlac, Luzón	15 31	120 35	Third	Atanasio Calliolio.
San Isidro	Nueva Ecija, Luzón	15 22	120 53	Second	Julio Catapang.
Arayat	Pampanga, Luzón	15 8	120 46	Third	Cirilo Lacsamana.
Pórac	do	15 5	120 32	Fourth	A. de Ocampo.
Olongapó	Zambales, Luzón	14 49	120 15	Second	Manuel Mucio.
Marilao	Bulacán, Luzón	14 46	120 56	Fourth	Perfecto Paulino.
Balanga	do	14 41	120 32	do	Francisco Tiangco.
Manila	Luzón	14 35	120 59		See pages 29 and 30.
Corregidor	Island of Corregidor	14 23	120 34	Third	Mariano Atienza.
San Antonio	Laguna, Luzón	14 21	121 32	Fourth	Faustino Lafrades.
Silang	Cavite, Luzón	14 14	120 58	do	Marcos Medina.
Atimonan	Tayabas, Luzón	14 0	121 55	First	León G. Guinto.
Nueva Cáceres	Camarines, Luzón	13 38	123 12	Third	Eduardo Ontengco.
Sumay	Island of Guam	13 26	144 40	do	Daniel Coath.
Legaspi	Albay, Luzón	13 9	123 45	First	Bernardino Costa.
Gubat	Sorsogón, Luzón	12 55	124 8	Third	Antonio Rocha.
Romblón	Island of Romblón	12 35	122 16	do	(Gregorio Quirong).
Palanoc	Masbate	12 22	123 37	Fourth	E. E. Diot.
Calbáyoc	Sámar	12 4	124 36	Third	Pío Santos.
Catbalogan	do	11 47	124 53	do	Dr. G. J. Cullen.
Borongan	do	11 42	125 25	Fourth	Rev. Cenáreo Montes.
Cápiz	Cápiz, Panay	11 35	122 45	Second	José E. de León.
Tacloban	Leyte	11 15	125 0	do	José M. Sison.
Ormoc	do	11 0	124 36	First	Ricardo A. Luna.
Cuyo	Island of Cuyo	10 51	121 0	Fourth	Hermógenes Villagracia.
San José de Buenavista.	Antique, Panay	10 44	121 56	Third	Benito Pelaez.
Tuburan	Cebú	10 44	123 48	do	Agapito Borja.
Iloílo	Iloílo, Panay	10 41	122 34	First	Domingo Torres.
Bacolod	Negros Occidental, Negros.	10 41	122 56	Third	Apolonio Gendrala.
Cebú	Cebú	10 18	123 54	First	Domingo de los Angeles.
Maasin	Leyte	10 8	124 50	Second	Isidro Arcega.
Surigao	Surigao, Mindanao	9 48	125 29	do	Ignacio L. Catelo.
Tagbilaran	Bohol	9 38	123 53	do	Fernando Rocha.
Yap	Island of Yap	9 29	138 8	Fourth	Rev. D. de Arbácegui.
Butúan	Surigao, Mindanao	8 55	125 31	Third	Feliciano C. Viloria.
Balingasag	Misamis, Mindanao	8 45	124 44	do	Mariano Capili.
Dapitan	do	8 38	123 23	do	Severino Hamac.
Caraga	Surigao, Mindanao	7 30	126 32	do	Juan Lugod.
Cotabato	Cotabato, Mindanao	7 13	124 12	do	Simplicio Soriano.
Dávao	Dávao, Mindanao	7 1	125 35	do	Lamberto García.
Zamboanga	Zamboanga, Mindanao	6 54	122 5	do	Francisco Ventua.
Isabela	Basilan	6 43	121 57	Fourth	Inocencia Rodríguez.
Joló	Joló	6 33	120 59	Third	Abundio Enrile.

NOTE.—The second-class station at Daet, Ambos Camarines, Luzón (Lat. 14° 4′ N., Long., 122° 56′ E.), has been temporarily suspended to meet the exigencies of the service.

Permit me, sir, to mention in this place the good services rendered the weather bureau by three American gentlemen: Doctor Cullen, Mr. Hart, and Mr. Diot. Dr. Gilbert J. Cullen, president of the provincial board of health of Sámar, has gratuitously taken charge of the third-class station at Catbalogan, Sámar, and fills his position with enthusiasm. It is true that his station is equipped far beyond the regulation third-class station—e. g., even with

typhoon signals, but the instruments are well employed; moreover, several of them are the private property of the observatory. Mr. Charles D. Hart (at present in the United States on leave of absence) when teacher on the island of Cuyo, was in charge of the rain station at Cuyo as paid observer. Ever since the cable connected Cuyo with Luzón he faithfully sent two daily reports by telegraph, a service which can not be required of fourth-class observers. Mr. E. E. Diot, of Palanoc, Masbate, has gone farther. After serving about two years as voluntary observer at Baler and Palanoc, he applied for regular appointment to cover expenses which in his case were connected with his service. In return for the nominal salary of a rain observer he not only sends two daily reports by cable like any third-class observer, but in case a typhoon crosses the Visayas, there is no observer in the whole meteorological service who, during the critical periods, keeps the central office so thoroughly posted as to the movements of his barometer.

(*b*) *Voluntary stations.*—A voluntary station, in the sense explained, exists since February, 1903, on the island of Malahi, Laguna de Bay, in charge of the surgeon of the post. Capt. Henry Page, assistant surgeon, U. S. Army, at whose request the instruments were sent, has already a third successor; but every succeeding officer has hitherto kept up the work.

Another set of instruments had been lent to Maj. L. W. V. Kennon, U. S. Army, who established a station at Twin Peaks, Benguet. This, however, came to a tragical end in a conflagration, which destroyed everything except the anemometer and rain gauge. Even these were badly damaged; whether irreparably or not we could not yet learn.

The government coal mines at Liguan, Albay, have likewise been provided with meteorological apparatus.

A set of maximum and minimum thermometers, dry and wet bulb thermometers, and a rain guage have been sent to Malabang, Mindanao, at the request of the commanding officer of the post, Colonel Huston, U. S. Army.

Mr. James W. Travis, teacher at Quiangan, Nueva Vizcaya, Mr. Perry P. Thompson, teacher at Echagüe, Isabela, and the provincial school at Dumaguete, Negros, have applied for and obtained the loan of instruments for meteorological observations.

A number of instruments has also been lent to the bureau of government laboratories and the forestry bureau.

Finally, a set of typhoon signals has been turned over to the quarantine station at Mariveles, where they are displayed in accordance with telegraphic instructions from the central office.

2. INSPECTION OF STATIONS.

The reports of the various observers are carefully examined and compared at the observatory and a considerable number of discrepancies, etc., is thus detected. But this control is inadequate. Frequent inspections would be very desirable to keep the observers impressed with the conviction that they must do their duty. During the past fiscal year, however, the funds disposable for contingent expenses did not seem to warrant such tours, until toward the close of said year a trip to the southern part of the archipelago became imperative. Consequently Rev. Miguel Saderra Masó, assistant director, and Rev. George M. Zwack, secretary of the Philippine weather bureau, proceeded south under instructions to inspect as many stations as they could reach. I beg to submit, following, the report of Fr. Zwack as rendered:

REV. AND DEAR FR. ALGUÉ: Carrying out your orders, dated May 11, 1905, Fr. Saderra Masó and myself embarked on the U. S. Army interislands transport *Elcano* May 17. Col. R. E. Thompson, chief signal officer of the Philippine division, had provided us with an order to all military telegraph operators, instructing them to promptly transmit whatever dispatches we might find necessary to send. In his kindness he had even gone so far as to procure a similar document from the superintendent of the constabulary signal service. Unfortunately we could make little use of the favor, since telegraphic communication was interrupted at most places. But this does not lessen the depth of gratitude which the observatory owes these officers.

In the morning of May 18, while off the eastern coast of Mindoro, we observed a small but beautiful waterspout. The same was first noticed at 6.18 a. m., and lasted about ten minutes, moving slowly northward, apparently parallel with the coast at a distance of rather more than a mile from the ship.

May 19 we reached Iloílo, where, according to your instructions, we were to expect the U. S. Army transport *Seward* in order that we might have ample time to adjust the affairs of the first-class station in said city. This station had been removed to the present site only a short time ago, and now there was danger of its being again transferred—this time to an outbuilding of the government building (an old kitchen), which is not only rather undignified, but would also require extensive repairs, with the costs of which the provincial government appeared to be desirous of burdening the weather bureau. Of course, the expenses incident to the translation of stations have in all instances to be met from the funds appropriated for the contingent expenses of the bureau.

We found the station installed in a suitable building belonging to the province, which is, however, sadly in need of repairs. Also, the grounds on which the outdoor instruments are mounted should be fenced off from the rest, on which carabaos, etc., roam. As far as things depend upon the observer, Mr. Domingo Torres, everything was found in good condition, except that the new anemometer is mounted somewhat too low. But this is hardly the fault of Mr Torres, since the state of our finances had made it impossible to place at his disposal the sum required for the improvement.

Unfortunately the station is too far from the harbor. This defect is partly remedied by the fact that the custom-house authorities possess a complete set of typhoon signals and attend to the hoisting thereof on the semaphore (which is in an excellent position), while the United States military authority has connected the station with the military telephone system. The observer is full of praise for the kindness and interest shown by the military authorities. As to the displaying of typhoon signals, there happened a disagreeable misunderstanding during the typhoon of last April. The custom-house, in consequence of a remark in the weather note given out by the central office, hoisted signal No. 5 ("Typhoon likely to prove dangerous to place"), thus causing considerable alarm, while the observer was directed by telegraph to cause signal No. 2 ("Typhoon will pass to the north at a distance") to be hoisted at Iloílo. It would be regrettable if such mistakes occurred oftener.

May 20 we had a conference with the governor of the province, the Hon. Raymundo Melliza, and afterwards with the provincial treasurer, Mr. C. C. McLain, for both of whom Mr. Frank W. Carpenter, assistant executive secretary, had given us letters of introduction and recommendation. After some discussion the honorable governor finally agreed to leave the station undisturbed and to have the necessary repairs made. It is devoutly hoped that he may be able to fulfill this promise.

The purpose of our stay at Iloílo being thus accomplished, and the *Seward* due to leave on May 24, we decided to inspect, if possible, the third-class station at Bacolod, Negros, which seemed greatly in need of such visit, since the observer, Apolonio Gendrala, had shown himself rather careless and even refractory ever since the provincial government—strictly within its own right—had forced him in September, 1904, to remove the station from the government building. As no commercial transportation suitable for our arrangements could be obtained, the collector of customs of the port of Iloílo, Mr. W. R. Watson, with greatest affability granted our request to send us to Bacolod on the revenue cutter *Skua*. At 8 a. m. of May 22 we embarked on our enterprise, accompanied by the surveyor of customs, Mr. D. E. Fee, and the chief observer of Iloílo. The trip was far from being one of unmixed pleasure, the heavy billows rolling in from the Pacific through the strait between Panay and Negros caused the elegant little steamer to roll and pitch most piteously, producing general seasickness, and wrecking, during one wild lurch, a fine traveling barometer—the private property of the staff. Happily we had with us a first-class aneroid barometer, which, during the rest of our voyage, served as standard with which to compare the barometers at the stations.

When we reached Bacolod, or, more accurately speaking, a point opposite Bacolod, but more than a mile from shore, beyond which the *Skua* could not approach, the sea was so rough that only the sense of duty could persuade us to take the risk of going ashore in the small rowboat of the cutter.

The station was found housed in a small native shack, but contrary to expectations things were in tolerably good shape, at least as far as the more delicate instruments are concerned, which are nicely arranged in the best room; but the Wilde anemometer had not yet been mounted—seven months after the translation of the station. The thermometer shelter is too closely surrounded by foliage, and the rain gauge is exposed to the pranks of naughty children. The observer talked of an early removal to better surroundings, but this is a flimsy excuse for past negligence. He does not seem to take any interest in his work, and made a bad impression. Should it be feasible to secure a better man for this station, the elimination from the meteorological service of the present incumbent is recommended, unless he changes his attitude radically and quickly.

After giving the observer the necessary hints as to observations and care of the apparatus and, figuratively speaking, reading the riot act to him, we hurried to get back to our launch. During the two hours which we had spent on shore the sea had become boisterous, and though the Filipinos rowed bravely and Mr. Fee steered with experienced hand, the situation became serious, as every now and then the white crest of an angry wave would break over and into the heavily laden boat. Luckily the "padrone" of the *Skua* conceived the good idea of coming toward us by feeling his way with the sounding lead (the tide having risen), and thus we were picked up before anything more tragical happened than a good drenching. A few hours of tossing and mal de mer, and we were safely back to Iloílo.

Permit me to mention the generous hospitality accorded us by the Augustinian Fathers of the college at Iloílo. During the six days' stay in said city they made us feel thoroughly at home, and, though the college is in straitened circumstances, they refused to accept any compensation. The whole expense resulting to the weather bureau from our stay at Iloílo was thus confined to the caromata hire for our official trips.

At 10 a. m. of May 24 the U. S. Army transport *Seward* left Iloílo. The next station to be visited was Zamboanga, which we reached on the 26th. The observer had not been advised of our coming, as were none of those visited after Bacolod.

The instruments were found to be well cared for, but the metal frames of the thermometers were heavily incrusted with a deposit, apparently salt from the spray of the sea, which the observer did not dare to remove, fearing to injure the graduation, a fear which is entirely unfounded, in so far as the graduation on said frames is quite unessential, since the real graduation is etched into the glass stem of the thermometers.

Though Zamboanga is at present only a third-class station, the provincial government permits the instruments to remain at the old fort. The anemograph and the thermometer shelter occupy an excellent position on the raised terrace of a parapet overlooking the sea, and the indoor instruments are installed in a very large room inside the office building. Still, the arrangement is not satisfactory, since the delicate instruments are accessible to any one of the numerous employees who during office hours occupy the room. It is, however, but just to these gentlemen to remark that hitherto no case of undue interference has occurred. Moreover, the observer is forced to live far from the station, as a salary of ₱30 per month will not permit the renting of expensive quarters near the fort. Finally, since the office in which the instruments are mounted is closed on Sundays and holidays, the observer keeps the barometer in his lodging, the ground floor of a native dwelling of the usual description. This constitutes a temptation not to go to the fort oftener than once a day in order to attend to the recording instruments and to read the maximum and minimum thermometers, and there is a suspicion that he occasionally succumbs to this temptation. He desires to remove the whole station to his dwelling, but this is impossible as he is accommodated at present. His lack of enthusiasm is demonstrated by his complaint that he is burdened with more instruments than the character of a third-class station requires. (Zamboanga was formerly a first-class station.) In fact, we relieved him of the baro-cyclonometer on our return trip. As far as could be ascertained during our short stay, the barometer at Zamboanga is 1.50 mm. too low.

The next station to be inspected would have been Isabela de Basilan if the stay of the *Seward* would have made it possible to cross the strait and return in time. We had to content ourselves with sending word to the newly appointed observer of said place to be at Zamboanga when the transport returned and leave for Jolo.

At Jolo (May 28) conditions are about the same as at Zamboanga. The instruments are installed in an excellent place—that is, in and above the light tower at the end of the solid harbor pier. But the observer keeps the barometer in his house, far from the tower, and there are serious doubts whether he visits the latter under all circumstances punctually at the appointed hours. Certain it is that he failed to do so at 2 p. m. of May 28, because at this time we were in sight of the tower without being able to discover a trace of the observer, Mr. Abundio Enrile. The barometer was found to be 0.60 mm. too low; the thermometer shelter in need of repair. The anemometer had not yet been mounted, for which the excuse was that he did not know where to put same. Here, also, the observer would prefer to have the station in his house, but this is not possible, since it is surrounded by higher buildings and tall trees and has no roof terrace on which to place the anemometer.

We had expected to visit Cotabato next, but the steamer anchored 6 miles below the town, and there was neither time nor boat to go up the river, the *Seward* stopping only about three hours. Nor had it been possible to order him by telegraph to come down on the quartermaster launch for a conference.

Returning to Zamboanga May 30, we found the observer of Isabela awaiting us. After imparting such instruction as was deemed necessary, we took with us the baro-cyclonometer of the station at Zamboanga and departed for Cebú, which we reached June 2.

The site to which the first-class station of Cebú has been relegated by the provincial authorities is one of the most miserable in the city, and the buliding is hidden away as if a station of the Philippine weather bureau were something of which to be ashamed. Otherwise the building, a diminutive house with one room and a closet, the whole surmounted by a small tower recently constructed under the direction of the observer at the expense of the bureau, is suitable and presents a pleasing appearance. As already stated, the observer, Mr. Domingo de los Ángeles, was unaware of the impending inspection, and hence could not have made special preparations. So much the more was I impressed by the neatness and cleanness of everything. It is unfortunate that the station is far from the harbor and completely out of sight of same. The custom-house authorities attend indeed to the displaying of the typhoon signals, but this may give rise to complications and certainly entails considerable expenses, since it necessitates the use of a commercial telephone, the rent of which, of course, must be paid by the weather bureau.

With regard to the next station on our route, the first-class station at Ormoc, there was a new disappointment. The transport came to anchor far from the town, the stay was only about two hours, and no boat to take us ashore.

At Tacloban our fate was similar; at a distance of 13 miles at the western entrance to

the strait of San Juanico, the *Seward* transferred passengers and freight for Tacloban and steamed off after a stay of two hours.

Better luck we met at Calbáyoc, where we landed June 3. Said landing was—shall I say picturesque? From the *Seward* we descended into a steam launch which made boldly for the shore. But alas! it did not get very far. A rowboat of antediluvian construction made its appearance and took us off the floundering steam craft; but it likewise failed to land us on terra firma. A quartermaster wagon went into the water to our rescue, we climbed into it, and thus finally gained the shore at the military camp, some distance from the town. The first man whom we happened to meet was Doctor Cullen, our enthusiastic voluntary observer at Catbalogan. As he was just going to town in an ambulance, we were saved from the alternative of either tramping on foot or applying to the unfailing generosity of the military authorities for a conveyance.

The third-class station at Calbáyoc is installed in the substantial house of a prominen- native, the father-in-law of the observer. Everything is in good order, with one except tion, viz, the thermometer shelter is raised only half a meter above a wooden platform and is situated too close to the kitchen.

Early in the afternoon we were rowed back to the *Seward*, which brought us home to Manila on June 5.

In concluding, I must confess myself a convert. Hitherto I never understood the necessity of these trips of inspection; now I am fully convinced of it. There are so many little doubts and difficulties which are never touched in correspondence, but are drawn out in personal intercourse. Moreover, I have seen with my own eyes that observers need watching and controlling. A fair amount of this can be and is exercised at the central office by examining and comparing the reports; but some things can not be detected in this way, as, for instance, a constant error in temperature observations. A high local temperature record may be due to local condition—e. g., the composition of the soil, but it may just as well be owing to a faulty location of the thermometers. If it were possible, every station of classes 1 to 3 should be visited at least once a year and without giving warning. This work is far from being pleasant for a member of the staff, as we are too much accustomed to the regular life of our community; still it should be performed by one of them, because there are grave doubts whether a Filipino employee of the bureau would have the necessary authority and possibly, even the indispensable courage and impartiality. It would, moreover, be highly desirable to devote at least a whole day to each station, but this would entail the use of commercial transportation, great loss of time in waiting for boats, and above all great expenses.

Very respectfully,

GEORGE M. ZWACK, *S. J.*

MANILA, *June 7, 1905.*

The hope expressed by Father Zwack regarding Iloílo has in the mean time been realized, as the house in which the station is installed has been repaired. Less satisfactory is the fact that a wrong typhoon signal has again been hoisted.

3. CHANGES IN STATIONS.

One station has been temporarily suspended and two new stations have been established during the past year.

(*a*) *Temporary suspension.*—The second-class station at Daet, Camarines, has been temporarily suspended January 1, 1905. This step was considered expedient in order to meet a threatening deficiency in the appropriation for salaries and wages and also to provide salaries for the contemplated stations at Yap and Guam, the erection of which was considered to be of greater importance. However, contrary to fond hopes, these latter did not commence operations until July 1, 1905.

(*b*) *Erection of new meteorological stations on the islands of Yap and Guam.*—In the last two annual reports the director of this bureau gave an account of the steps taken to secure a meteorological station on the island of Guam. These resulted in nothing beyond the authorization on the part of the insular government in 1903. Thanks to the zeal of the present governor of Guam, Commander George L. Dyer, U. S. Navy, our endeavors were more successful during the year 1904. It was finally arranged that until the weather bureau could establish a station, Governor Dyer would order observations made on board the station ship *Supply* and telegraph full particulars whenever the weather conditions required such warning. The correspondence on this subject and the instructions drawn up for the observer were given in full in the report for the fiscal year 1903–1904.

It is with a sense of deep gratitude to all who cooperated toward obtaining the result so much desired that the director announces the fact that since July 1, 1905, a meteorological station exists on the island of Guam (Marianas group) and another on the German island of Yap (Western Carolines). The prominent part which Governor Dyer took in bringing

about this happy termination of our endeavors will clearly appear from the following documents.

In reply to a letter thanking him for three weather telegrams and for his great and active interest in our work, he wrote:

GOVERNMENT HOUSE,
Agaña, Island of Guam, January 13, 1905.

MY DEAR FATHER ALGUÉ.— * * * It is very gratifying to know that the meteorological observations taken here were of value to you, and I trust you will be able to establish a satisfactory station at this point. You may be sure that I will take a very active interest in forwarding your plans. I have learned, unofficially, that the cable from Yap, connecting with Borneo, will be landed here in March. The employees of the American company now here are preparing the trench for landing the shore end of the Yap cable. This will give you a greater scope for your observations.

I regret that my illness in Manila prevented my seeing more of you and learning more of your useful work. * * *

Very cordially, yours,

G. L. DYER,
Commander, U. S. Navy, Governor of Guam.

On the occasion of the visit mentioned in the letter it had been agreed that meteorological instruments should be sent to Guam on the U. S. N. T. *Solace* and that Mr. Pimley, an official of the cable company stationed at Sumay, Guam (who accompanied Governor Dyer), should act as observer. But nothing came of this arrangement, owing chiefly to our desire of keeping the unavoidable deficiency for the fiscal year 1905 down to as low a figure as possible. The above communication, however, changed the aspect of things, especially as the honorable Commission had in the meanwhile relieved our financial embarrassment.

The steps taken on our part are set forth in the following communication addressed by the director to the honorable, the secretary of the interior.

PHILIPPINE WEATHER BUREAU,
Manila, March 13, 1905.

The SECRETARY OF THE INTERIOR,
Philippine Government, Manila, P. I.

SIR: Commander George L. Dyer, U. S. Navy, governor of Guam, who takes the greatest interest in the work of this bureau, has "unofficially" informed me that the cable from Yap, connecting Borneo, will be landed on the island of Guam during the present month of March. Hence Yap will be in telegraphic communication with Manila before this year's typhoon season begins. Already in Part II of the report for 1902, a meteorological station on Yap was pointed out as something very desirable. A glance at the inclosed sketch map of the Far East (see Pl. X) will convince you that, with stations on Guam and Yap, both connected with Manila by cable, the efficiency of the Philippine weather bureau as an outpost to guard the whole of the Far East against surprises in the line of typhoons would be greatly increased. The station on Guam, the erection of which is already authorized, and the station on Yap, for which authorization is sought, will round off the system of the Philippine meteorological service toward the east. Ponape, which was likewise mentioned in the report for 1902, is no longer considered, being too far east to be of vital importance.

Owing to difficulties, chiefly of a financial nature, the station on Guam has not yet been erected. But Governor Dyer caused observations to be made on board the station ship, and on three occasions, when the weather conditions were such as described in the detailed instructions furnished by this bureau, he sent cablegrams according to a prearranged cipher. As it turned out, none of the 3 typhoons thus announced seriously affected the Philippine Islands, but the warning benefited Japan and the shipping bound for the southeast.

Guam enables us to announce the existence of a typhoon twenty-four to forty-eight hours earlier than we could do if dependent only on the stations within the archipelago, but the direction of the track must remain uncertain until the disturbance sufficiently affects the Philippines. With a station on Yap, however, things will be different. Twenty-four to forty-eight hours earlier than now we can foretell, with a probability bordering on certainty, whether a storm is going to cross the archipelago or not. The importance of this not only for these islands but chiefly for Japan, Hongkong, and the southern part of Indo-China is evident.

I am fully aware of the fact that the insular government sees itself confronted by the necessity of economizing. Still, I make bold to say that it should not hesitate to seize this opportunity of rendering an important service to the whole Far East; so much the less as the cost will be really nominal compared with the advantage bound to accrue.

NOTE.—Plate referred to above is on file in the office of the Bureau of Insular Affairs, War Department.

The instruments for the two stations are already on hand. As to the salaries of the observers, the present appropriation will suffice. At Guam the second officer of the cable station is willing to serve as observer for the compensation of a third-class observer, $180 per year. Concerning Yap, the superior of the Capuchins in this city, on whom the Capuchin Fathers at Yap depend, has most willingly accepted the proposition that the Fathers on said island act as observers for the weather bureau, receiving for their services the compensation of a rain observer, $90 per year. Considering the importance of the services I would willingly erect a third-class station, but then the appropriation would not suffice. Thus a continuous and conscientious service will be secured. The funds for these salaries have been made available by the suspension of the second-class station at Daet.

The chief difficulty lies in establishing these stations. Correspondence will not answer the purpose for two reasons:

1. Yap being a German possession, the authorities have to be consulted. Though they could hardly hinder the erection, because the missionaries are private persons and have the right to make meteorological observations and also to transmit them by commercial cable, provided they pay, still prudence dictates a deferential way of making the arrangements. With the present lack of communications the impending typhoon season would be a matter of history long before the station could be in working order if the negotiations are to be carried out by letters.

2. It is important that the observers be well instructed.

It is, therefore, necessary that a member of the staff of the weather bureau go to Yap and Guam. Father Zwack, owing to his command of English and German, is considered the best man for the work, and has consented to go. I approached Rear-Admiral Stirling on the matter of transportation, thinking that his authority might extend sufficiently far to warrant his extending the cruises of a gunboat as far as the two islands. But he declared that, while willing to do all in his power, he had no authority for this, as these islands were entirely outside his sphere. He suggested, however, that the regular way would be, if the Philippine government would cable to Washington requesting authority, for the Admiral commanding the United States Asiatic Fleet to send a United States ship to the islands and for the purpose mentioned. I am perfectly aware of the great expense thus caused the United States Treasury; but considering the international importance of the two stations, I believe it justified. Much larger sums are frequently spent for purposes vastly less important, e. g., for eclipse expeditions.

As Admiral Stirling will leave in a few days and the attitude of his successor in command of the Asiatic Fleet might possibly be less favorable, I would respectfully suggest immediate action.

Very respectfully,

JOSÉ ALGUÉ,
Director.

NOTE.—The fear that the successor of Admiral Stirling might be less favorable to our plans did not arise from any knowledge we had of said successor, and was certainly unfounded, as will appear from the sequel.

The above letter was returned with the following indorsement by the honorable, the secretary of the interior:

MARCH, 18, 1905.

Respectfully returned to the director of the Philippine weather bureau. The undersigned would not feel justified in recommending that the Government of the United States send a war vessel to Yap and Guam for the sole purpose mentioned in this communication. He therefore wired Admiral Stirling as follows:

"When will next naval collier go to Guam? How much out of her way would she have to run to call at Yap Island?" and received the following reply:

"Collier uncertain. *Solace* probably Manila in July. Yap Island is about one hundred miles out of way. Will refer cable to my successor, Admiral Folger."

It is probable that some arrangement may be made for leaving observers, instruments, and instructions at the place mentioned without putting the United States Government to the heavy expense of sending a special vessel for this purpose.

DEAN C. WORCESTER,
Secretary of the Interior.

May 17. Father Algué, accompanied by Father Zwack, called on Rear-Admiral Charles J. Train (who in the meanwhile had succeeded Admiral Folger in the command of the Fleet), on board the *Rainbow*. They were informed that the U. S. Collier *Alexander* would leave Manila for Guam about June 1, but everything had been arranged for a trip of inspection of some southern stations, on which Father Zwack was to leave that very afternoon and whence he would not return until June 5. It was therefore agreed upon that he should go on the *Solace* about the middle of July, the Admiral most generously granting transportation and promising to send her via Yap. On afterthought a new difficulty presented itself. Father Algué had for the moment forgotten that he himself had to leave on July

11 for Europe. Since it would have been very inconvenient to have at the same time the director gone and also the secretary, who by the nature of his duties is more intimately acquainted with the external relations of the bureau than any other officer, the director made bold to lay the circumstances before Admiral Train in a letter dated May 28, 1905, and to ask the somewhat unusual favor of having the departure of the collier delayed. In reply came the following gracious communication:

UNITED STATES ASIATIC FLEET,
OFFICE OF THE COMMANDER IN CHIEF, FLAGSHIP OHIO,
Cavite, P. I., May 31, 1905.

MY DEAR FATHER ALGUÉ: The Admiral is in receipt of your letter of May 29. * * * I am directed to inform you that the Admiral has been pleased to make arrangements so that your wishes can be complied with in this matter. The *Alexander* will leave here on June 8 and will touch at some port in the island of Sámar on her way to the islands of Yap and Guam.

Very sincerely, yours,

F. F. FLETCHER,
Commander, U. S. Navy, Chief of Staff.

Before inserting the report of Fr. Zwack on the actual establishment of the station permit me, sir, to exhibit one more illustration of the intense interest taken by Governor Dyer in the matter, viz, an extract from his letter of May 29, 1905.

3. You have before this received by letter, No. 317, dated April 25, a copy of which is inclosed. If you wish to send an observer to Yap, and will make your arrangements with the governor to receive him, and can get him here to Guam, I will send him over to Yap by the station ship here. A collier is leaving Manila about June the 1st to come here. Thinking you might want to send your observer to Guam, I cabled to the commandant of the Cavite navy-yard on May 23 to notify you. This letter will scarcely reach you before the collier leaves Cavite for this port, but you will have an opportunity to send an observer by the *Solace*, which is due here on her way to Manila on the 7th of June.

4. Should you wish to send over Fr. Zwack on the *Solace*, or by any other conveyance, I will send him to Yap and bring him back here. He could take the following army transport from here back to Manila. Of course, some great emergency might arise which might prevent my sending the *Supply* to Yap for the time being, but this chance may be safely left out of the consideration.

Very sincerely,

G. L. DYER,
Commander, U. S. Navy, Commandant.

REPORT OF REV. GEORGE M. ZWACK, SECRETARY OF THE PHILIPPINE WEATHER BUREAU, ON THE ESTABLISHMENT OF THE STATIONS ON YAP AND GUAM.

Pursuant to your order of June 6, 1905, Mr, Cesáreo Dulueña, a first-class observer of the Philippine weather bureau, and myself embarked on the U. S. naval collier *Alexander* on June 8, 1905, to establish the meteorological stations on the islands of Yap and Guam. In order to avoid the inconvenience and even danger of having repeatedly to transfer the multitude of parcels—some containing delicate instruments—constituting our baggage, Commander Helm, chief of the bureau of coast guard and transportation, sent us to Cavite, where the collier was anchored, in a special launch.

The *Alexander* weighed anchor at 1 p. m., but made slow progress, as she was under orders to sail in company with the U. S. gunboat *Pampanga*, bound for Laguan, Sámar. We came to anchor in the vicinity of the latter place June 10 at 10.20 a. m. There we met the gunboat *Paragua*, and after unloading two steam launches, of which the gunboats took charge, the *Alexander* turned her bow toward Yap at 1.40 p. m.

On June 14 at about 7.30 p. m. we arrived opposite the harbor of Yap, but could not attempt the exceedingly difficult entrance until daylight next morning, June 15. In passing, I may remark that, according to the *Alexander's* log, the group of islands known as Yap is 4 miles to the east of the position assigned to it on the pilot charts. The same result was found by the cable steamer *Stephan*, as we learned from the governor. The longitude of Yap given in the list of stations will, consequently, be found 4′ in excess of that given on maps.

My first visit was paid to the "Bezirks-Amtmann," the highest official on the spot and, to all intents and purposes, the governor of the small islands, whose permission was, if not essential, at least highly desirable for my undertaking. He was rather surprised at the manner of my coming in a United States ship, sent out of her course for the purpose. He showed himself very kind and had no objections to my plans, especially when, quite of my own accord, I handed him a carbon copy of the instructions for the observer, which give the full key of the cipher used in transmitting information, an action which made it

evident that no harm was plotted against the "Fatherland" by the establishment of a meteorological station on the island. He also furnished carriers for the instruments and invited Capt. A. E. Gove of the collier and myself to luncheon. Captain Gove revenged himself the next day by entertaining the governor at a splendid dinner on board.

As communication with Yap is so very difficult (there are only three steamers per year which touch the island on their way from Hongkong to Australia and returning), it was important to secure an intelligent and conscientious observer and, moreover, to insure permanency. As pointed out in your letter of March 13, 1905, to the honorable the Secretary of the Interior, it was considered best to ask the missionaries on the island to act as observers, giving them as compensation the salary of a rain observer, viz, 15 pesos per month. Having obtained the good will of the governor, we next directed our steps to the mission, which is built on a spur of the higher mountains forming the backbone of the island, and overlooks the whole settlement—a beautiful spot! The higher eminences are sufficiently distant not to interfere with the observations of winds and clouds.

We found 1 Spanish and 1 German Capuchin Father and 2 Spanish lay brothers. The missionaries, who, as I learned, are not dependent upon the Capuchins in Manila, had already some idea of our plans, and I had no difficulty in arranging matters with them.

There were several reasons for hurrying and it proved providential that we did so, else we would have missed the transport which was to bring us back to Manila from Guam. Hence we did not mount all the instruments, but merely selected the sites for them and gave instructions how to install them. The rain gauge and thermometer shelter, which latter they agreed to construct according to photographs given them, will be placed in a small garden in front of the church, sufficiently removed from plants and meddlesome people; the Wilde anemometer will be mounted above the rear gable of the church. The barometer we installed in a corridor accessible only to the missionaries and determined its correction for elevation above sea level by direct simultaneous observation, made by Mr. Dulueña at sea level (within sight of the house and only a few hundred yards distant) and by me on the barometer mounted in its permanent place. This correction, +2.94 mm. indicates that the cistern of the barometer is about 31 meters above the level of the sea. It is needless to say that the Rev. Fathers had no difficulty in comprehending our instructions regarding the care of the instruments and the manner of making the observations. The station is to begin operations on July 1, the Rev. Superior being in charge. This, of course, does not imply that he makes the observations personally, but he is responsible that they are made conscientiously.

I also called on the superintendent of the cable station and obtained the promise that the weather dispatches would be promptly forwarded. It is to be remarked that at Yap every cablegram must be filed with the postmaster, who transmits it to the cable office. But mail is a rare occurence, and the postmaster has also other offices. It may, therefore, happen that he can not be found for several hours. In these cases our cablegrams will be forwarded first and filed afterwards. Less successful were my endeavors to obtain reduced rates for the weather telegrams. I understood that the superintendent has no authority in the matter, but hoped that the question could be disposed of by his cabling to headquarters. However, while I was at Guam, he informed me over the wire that the weather bureau would have to apply by letter to the directors of the cable company, at Cologne, Germany.

Thus passed June 15 and the forenoon of the 16th. Toward noon I and Mr. Dulueña returned to the ship, and after dinner I reported to Captain Gove that the purpose for which I had come to Yap had been accomplished. At 4.15 p. m. the *Alexander* wound her way through the sinuous entrance of the harbor and headed ENE. in search of Guam.

Though the collier dropped her anchor in the harbor of the San Luis de Apra as early as 2.15 a. m. of June 19, it was 10.30 before we descended into the rowboat which was to land us at Piti and about 3 p. m. when we arrived at the governor's palace in Agaña, the capital, distant 6 miles from the landing pier.

Permit me to say a few words about my trip on the *Alexander*. Being a collier this ship has absolutely no accommodations for passengers. Everyone of the deck officers offered indeed to share his cabin with me, but unwilling to be even the slightest inconvenience to anyone, I decided to "rough it," sleeping on deck when it was not raining too hard and taking refuge in the chart room or dining room when it became too uncomfortable outside. Still, owing to the genial kindness of Captain Gove and the other officers, I thoroughly enjoyed this part of my voyage.

At Agaña the reception on the part of the honorable governor was such as might be expected of Commander Dyer. Early next morning he sent us down to Piti, where we found a boat and oarsmen at our disposal for the day. We called first at the *Alexander* to remove our baggage and then sailed over to Sumay, near which village is situated the cable station on a cliff of Orote promontory in the air line about 7½ miles from Agaña.

I found the superintendent of the cable office, Mr. Daniel Coath, a delightful gentleman. The final negotiations presented no difficulties, and we proceeded to unpack, test, and explain the instruments and to complete the practical instruction of the intended observer.

The new meteorological station, which will begin work on July 1, is of the third class,

but has a somewhat superior equipment, consisting of the following instruments: Mercurial barometer, system Tonnelot; barograph; psychrometer; maximum and minimum thermometers, anemograph, and rain gauge. Though Mr. Coath placed the mechanic of the cable station at our disposal, it was impossible to go further than mounting the barometer and assembling the other instruments, since their installation requires considerable preparations and the transport might arrive earlier than expected. The more delicate pieces of apparatus will be installed in the operating room. For the outdoor instruments there is plenty of space on the grounds of the cable station and their mounting may safely be left to the gentlemen concerned.

The correction of the barometer for elevation we determined in the manner employed at Yap, viz, by simultaneous observations, the local conditions being the same as at the former station. The correction was found to be +1.18 mm., which indicates that the cistern of the barometer is 12.5 meters above the level of the sea.

In the matter of appointing an observer, or rather a gentleman in charge of the station, I thought it best to depart from instructions and entrust it to Mr. Coath, or more strictly speaking, to the superintendent of the cable station, to the evident relief of Mr. Pimley. It developed that the appointment of the latter gentleman would require renewed correspondence with the general manager of the cable company, since the latter had authorized the superintendent to act as "correspondent" of the Philippine weather bureau. Moreover, by his appointment Mr. Pimley would have been placed in a somewhat awkward position, which is avoided if the gentleman in charge of the meteorological station has at the same time authority over the whole establishment and its resources. Finally, the permanency of the station seems to be more assured if it is under the direction of the superintendent, for, though the individual gentleman may leave (and it is not likely that the superintendent will be changed as frequently as a subordinate official), there will always be a superintendent. Mr. Coath, of course, does not make the observations personally. They will be made by Mr. Pimley, to whom the superintendent turns over the whole salary of 30 pesos per month. But Mr. Coath is in charge of the station at Sumay, and all business concerning same has to be transacted with him.

Hardly had we finished our task when the station ship of Guam, the *Supply*, ran up the quartermaster flag on her foremast, the U. S. A. T. *Sheridan* had been sighted. An unpleasant surprise, but there was no remedy. The *Sheridan* had made a record run on this trip. Our boat brought us back to Piti, where I was told that the transport had only 37 tons of freight for Guam and consequently might leave during the night, as soon as the moon would have risen. With this possibility in sight there was no time to wait until the intentions of the quartermaster captain of the incoming ship could be ascertained. Hence I hurried to Agañá to take leave of Commander Dyer, who sent me back to Piti in his own carriage. At Piti news had, in the meanwhile, been received from the transport that she would not sail until 3 p. m. of the following day. But it was too late for me, and so I went on board. The *Sheridan* was overcrowded. Despite the special order of Colonel Clem, the chief quartermaster of the Philippine division and the good will of the quartermaster captain on board, no better accommodation could be secured than a berth in one of the dormitories, and even this had first to be vacated by its occupant, a noncommissioned officer. It served Mr. Dulueña for the first night. I myself was taken off the ship by Mr. Coath, who came over with Miss Coath, and upon learning the state of affairs, simply insisted upon my going with him to the cable station. There Mr. Coath and his family made me thoroughly feel at home, and I felt as if parting from dear friends when next noon I had to return to the ship.

June 21, at 3.45 p. m., the *Sheridan* weighed anchor and steamed majestically out of the harbor of San Luis de Apra, bound for the "Pearl of the Orient," which she reached, after a rapid and extremely smooth passage, in the early morning of June 26.

Very respectfully,

GEORGE M. ZWACK.

MANILA, *June 29, 1905.*

The utility of the two new stations was soon to be demonstrated. The weather note of 11 a. m., July 14, stated: "There are indications of a depression in the Pacific." At about 2.30 p. m. we received the following dispatch from Guam: "1414536604 0603060409," which reads:

Guam, July 14, at 2 p. m.: Barometer, corrected and reduced, 753.6 mm. There is a moderate sea running from east. A breeze of 13–18 miles per hour is blowing persistently from east-northeast. Sky nearly completely covered with strato-cumulus clouds, which come from the east.

The situation was clear, except for the direction of the swell. May be that local conditions influence same at Guam. Half an hour later Yap cabled as follows: "1414537500 1206071210," that is:

Yap, July 14, 2 p. m.: Barometer, corrected and reduced, 753.7 mm. Long rolling sea, direction not ascertained. A strong breeze of 28–34 miles per hour is blowing from the west and the whole sky is covered with rain clouds running from west to east.

Thus we were enabled to publish the following information: "3.30 p. m., cablegrams from Guam and Yap confirm the existence of the depression mentioned in the weather note of 11 a. m. The same is far out in the Pacific, west of Guam and to the north of Yap."

The depression thus located when it was still about 1,000 miles from Manila moved westward with average velocity, and it was not until two days later that it was thought advisable to hoist the typhoon signals at the capital.

4. Desiderata.

The erection of the stations on Yap and Guam rounds off the system of the Philippine meteorological service toward the east. Two stations on the east coast of Mindanao and one each on the eastern coasts of Sámar and northern Luzón having telegraphic connection with Manila would be very valuable. The present stations at Caraga, in Mindanao; Borongan, in Sámar; and Baler, in Príncipe, Luzón, would answer the purpose, but none of them has a telegraph.

Of greater importance, however, would be stations at Puerto Princesa, island of Palawan, and Cape Melville, island of Balabac, if they could report by cable. As it is now, as soon as a depression crossing in low latitudes has passed west of the one hundred and twenty-first meridian we have no adequate means for following its movements. It is true that then the danger for the archipelago is practically over, because there is but little chance for doing mischief on the island of Palawan. But we must never lose sight of the international task of the Philippine weather bureau; beyond Palawan lies French Indo-China.

There is hardly a doubt that the penal colony established on Palawan will some day necessitate the extension of the cable from Cuyo to Puerto Princesa; but the hope that it will be carried on to Cape Melville is slight indeed, though several naval officers have already pointed out the strategic importance of such extension in case of complications in the Far East.

III. DIFFICULTIES AND PLANS.

1. Difficulties.

(*a*) Some difficulty has been experienced on account of observers accepting other positions. According to law, the third-class observers and rain observers of the weather bureau can indeed do so, but the additional occupation must be compatible with their duties as observers. Moreover, the appointment should not be made without the previous consent of the chief of the weather bureau. Both conditions were sadly deficient in the case of Mr. Macario Reyes, former third-class observer at San José de Buenavista, Panay. His alleged observations became so worthless that his resignation was demanded, and then we learned that he had become a "constabulario" and had for days been absent from his station, leaving the observations to the care of his wife.

Another observer, Antonio Pereira, at Isabela de Basilan, simply left his station and informed the director that he had "dismissed himself," and handed the instruments over to a native teacher, who had a "right" to the position.

Directly in violation of the law was the appointment of the second-class observer at Surigao, Ignacio L. Catelo, to the position of inspector of customs; but only after his salary had been withheld for several months could he be induced to even inform the director of the nature of his new position and to relinquish same; whereupon his back salary was paid.

Mr. Juan Santos, second-class observer at Bolinao, likewise accepted the office of notary public without consulting anyone. But as the new office entails hardly any work in a place like Bolinao and most of it can be done by the "escribano" whom he engaged, special authorization was asked and obtained for him from proper authority.

(*b*) Annoying difficulties arise from the unwillingness of some provincial governments to provide really "suitable" quarters for first and second class stations in accordance with Act No. 368 of the honorable Philippine Commission. It is feared that now and then the lack of tact on the part of the observer, who easily imagines himself to be an important personage, has something to do with this sentiment. But it can not be denied that some officials either find it galling that provision should be made for a bureau over which they have no control, or have too limited a horizon to understand that the common utility may demand sacrifices which may possibly not directly benefit their own pueblo or province.

Since the Philippine weather bureau is a permanent institution, I would respectfully submit for consideration whether it would not be advisable that the meteorological service gradually acquire its own small buildings erected on suitable sites which are the property of the insular government.

2. PLANS.

(*a*) *Proposed time ball on Engineer Island.*—The following two letters are self-explanatory. I need only add that the discussion of the subject did not go further. And permit me to state that the thanks to Commander Helm expressed in the answer of Father Algué are not merely a polite phrase; they are meant literally, since Commander Helm has never refused the weather bureau any favor the granting of which was in his power:

BUREAU OF COAST GUARD AND TRANSPORTATION,
Manila, P. I., January 24, 1905.

Rev. JOSÉ ALGUÉ, S. J.,
Director of the Weather Bureau, Manila, P. I.

SIR: I have the honor to inform you that the bureau of coast guard and transportation has moved into new quarters on Engineer Island.

We have a telegraph office and operator in the main offices; also quite a high building used as machine shops, etc. I was wondering whether or not you had satisfactory time-ball service or other means of signaling the noon hour to shipping people and others interested, or if you would care to establish a time ball down here, to be dropped and regulated from the observatory with our cooperation.

We will be glad to do anything we can along these lines if you are not already provided with all the conveniences that you wish.

Yours, very truly,

J. M. HELM,
Commander, U. S. Navy, Chief of Bureau.

PHILIPPINE WEATHER BUREAU,
Manila Observatory, January 31, 1905.

Commander J. M. HELM, U. S. Navy,
Chief, Coast Guard and Transportation, Manila, P. I.

SIR: Permit me to express my grateful appreciation of the interest you take in the work of this observatory, of which interest your favor of the 24th instant is a new proof.

In reply I beg to say that the time ball is being dropped at the observatory at noon of the one hundred and twentieth meridian. The signal is well visible from every part of the harbor, and no complaint has been received. A time ball on Engineer Island would probably be visible to the shipping in the river and to a part of the city, and hence a good thing, but there are two serious difficulties in the way. The difficulty consists in the fact that the weather bureau is so greatly hampered by lack of funds that the outlay occasioned by the installation of a time ball on Engineer Island is simply out of question. The other difficulty is of a technical nature, viz, the dropping of the ball, supposing it installed. It would not do to telephone the time and have one of your men drop the ball; the signal would be too unreliable, two personal equations being introduced. Moreover, the line might be "busy" just at the critical moment. The current of the telegraph line could be made to operate a relay on the island, thus cutting in a powerful battery, which might release the ball. But, again, this would suppose both lines, the one from the central office to the weather bureau, and the other from the same office to Engineer Island, to be unoccupied at the time; and, moreover, that the operator at central establishes direct connection between the two lines mentioned. The current to operate the release would have to be very powerful, and consequently there would be a troublesome battery of a goodly number of cells to attend to. We tried the electric release at the observatory, but found it unsatisfactory.

If you see your way toward overcoming these difficulties and installing an electrically operated time ball on Engineer Island, we will be glad to do the dropping; but for the reasons stated we are unable to do anything else.

Thanking you again for your very great kindness, I am yours, very respectfully,

JOSÉ ALGUÉ, *Director.*

(*b*) *The proposed new system of crop reporting.*—Mr. M. L. McCollough, while editor of the Official Gazette, had proposed a new system of crop reporting, the essential features of which consisted in the cooperation of the provincial and municipal governments throughout the archipelago, of various bureaus of the insular government, and of voluntary observers—all under the direction of the editor of the Official Gazette. This plan has been the subject of considerable correspondence, the last document of which, giving the views of the weather bureau and affording a good idea of the whole subject, is subjoined.

After a synopsis of the various documents submitted by Mr. McCollough to the honorable the secretary of the interior and of the numerous indorsements (pages 1–9), which it would

be superfluous to reproduce, as it was solely intended to save the trouble of plowing again and again through the whole, the views of the weather bureau are given as follows:

[Extract from a letter of the director of the Philippine weather bureau to the honorable the secretary of the interior.]

MANILA, P. I., *January 15, 1905.*

After careful consideration of the matter proposed, I beg to say that the Philippine weather bureau is indeed perfectly willing to cooperate with anyone and in any manner that the government may decide upon, but if asked my opinion as to whether the perfected crop service should be entrusted to the office of the Official Gazette rather than to the weather bureau, I say most emphatically, It should not.

I. A MORE PERFECT CROP SERVICE IS DESIRABLE.

1. The necessity of perfecting the crop service. I perfectly concur in the statements adduced by the editor of the Official Gazette as to the desirability of a better crop service. I am inclined to think that in course of time a perfect system will become a real necessity, but may be permitted to say that at present, and for many years to come, the matter is by no means so important as it is in the United States. Very high officials of the government (including the present honorable Secretary of War, when governor of these islands), who probably know the needs of the Philippines as well as anyone, do not seem to consider the matter so extremely urgent. However, the importance of agricultural interests in the Archipelago and the value of Philippine commerce will increase, and it is imperative that the crop service keep abreast with improved conditions. If it can be kept slightly in advance of them, so much the better. At any rate, the aim should be to have the best service possible under existing conditions.

2. The perfection of the United States system is impossible here. The system of crop reporting used in the United States is admirable, but entirely out of question here, at least for the present, and probably for a century or more to come. (*a*) We have not the great number of persons who can make an intelligent report, which is necessary. The Filipino is liable to report crops flourishing when they have been utterly destroyed—let us say by locusts—for miles around, merely because his small patch has been spared, and vice versa. (*b*) The native farmer, with rare exceptions, takes no interest in the reporting nor in the reports published. (*c*) The communication is altogether too slow, owing to the nature of the country. In Washington the reports covering a month are given out on the 10th of the following month. Here the reports from many stations will not arrive at the central office until five to six weeks after the end of the month to which they refer. Now, these stations will be nearly always those which can not be reached by telegraph, either. Consequently there is no remedy. (*d*) In the United States the reports given out by headquarters are telegraphed to all parts of the country, and within a few hours after the dispatches have been sent printed cards are mailed to every postmaster for posting. Here probably nobody has more fully experienced the difficulties of getting information over the wires than we. As to the cards, we have to reckon with the bureau of public printing. Much of the fact that the crop service of the weather bureau is "unsatisfactory except from a meteorological and historical standpoint" [Mr. McCollough] is due, besides the difficulty of communicating by mail, to the delays which the Monthly Bulletin regularly experiences in the bureau of public printing. From the dates on which the requisitions for printing (duplicates) have been returned, we know that there has been practically no delay in the office of the honorable secretary of the interior. Still, the average time which elapses between the date of the requisition and the receipt of the printed bulletin is thirty-seven days. That is in cases in which the requisition had been made "special, by order of the honorable the secretary of the interior." The bulletin for January, 1904, not bearing this remark, took seventy-one days.

II. WHO SHOULD HAVE CHARGE OF THE CROP SERVICE.

1. Impracticability of crop reporting by the Official Gazette. On pages 6 and 7 of his memorial, the editor of said Gazette gives three reasons why the insular bureau of agriculture can not undertake the work, viz: The lack of public spirit in these islands; the scarcity of public funds; the law entrusting the Philippine weather bureau with said service. It certainly does appear as if these reasons, if they are really good, held at least equally well against the Official Gazette.

(*a*) Lack of public spirit will confront every bureau which undertakes the work. Why the Official Gazette, more than any other bureau, should "receive the active moral and material support of all bureaus of the government," etc., is far from being evident, especially so as the reason given for this, viz, the Gazette's "relation to each of these," is not existing. The same legislative or executive action, which alone can assure the success of

the scheme, will secure the same degree of cooperation to any bureau which may be commissioned to compile the reports.

(*b*) The condition of the insular treasury seems to militate against the Gazette rather more than against most other bureaus. The Official Roster for 1904 gives the office force at the disposal of the editor of the Gazette as five native clerks. Unless this staff is too large in proportion to its present duties, the editor will be unable to perform the additional work entailed by the crop service as planned by him. The necessary consequence will be a call for a greater clerical force—i. e., for more money.

(*c*) If the law entrusting the Philippine weather bureau with the crop service bars the bureau of agriculture from undertaking the work, it holds equally well against the Official Gazette. In either case a modification will be necessary.

TO THESE REASONS I BEG TO ADD TWO MORE.

(*d*) The nature of the work of crop reporting, while well within the scope of the bureau of agriculture (see Act No. 261, section 1), is entirely foreign to the purpose for which the office of the Gazette has been created, viz, "to receive, collect, and prepare for publication the various laws, orders, decisions, and other public documents which it is designed to publish in the Official Gazette." There is, indeed, the clause, "and to perform such other duties as the secretary of public instruction may direct," but it is not apparent how this can be construed to include the contemplated service which, as the honorable secretary of public instruction pointed out, falls under the direction of the secretary of the interior.

(*e*) The editor of the Gazette and his staff have no experience whatever in this kind of work.

2. The extended crop service should be rendered by the weather bureau.

Before setting forth the reasons which seem to make it advisable that the crop reporting be done by the weather bureau, I wish to disclaim most energetically any private motive in my doing so. The weather bureau does not seek an importance over and above its natural scope, and the perfected crop service will only add more work and an increased responsibility. The whole is simply a question as to what is more conducive to the public good.

I also beg to call attention to the fact that the question Who is to prepare the reports? is entirely different from the one as to the method of their publication. At present I am treating only the former.

The reasons for which the crop reports should be prepared by the weather bureau are the following:

(*a*) The law—Act No. 131, establishing the Philippine weather bureau—seems to take it for granted that crop reporting is part of the work to be performed by the weather bureau, section 4 of said act merely providing for the publication of "a résumé of the crop reports received from the branch stations" in the Bulletin and Annual Report. I confess that this reason is not very cogent as far as the projected system is concerned, since Act No. 131 speaks only of the reports received from the branch stations of the weather bureau, but it clearly shows the trend of opinion in the legislative body of the islands.

(*b*) The clearly expressed opinion of high officials, scil., of the honorable secretary of the interior and the honorable secretary of public instruction, as shown in the documents returned.

(*c*) The question of jurisdiction. As the Philippine government has no special department of agriculture, crop reporting most naturally comes under the jurisdiction of the secretary of the interior, since it is intimately connected with the interests confided to his care. This is also pointed out by the honorable secretary of public instruction, as mentioned. Moreover, with the exception of the voluntary aid expected of the bureau of education, all bureaus to be employed in crop reporting belong to the department of the interior. It is therefore only natural that one of these should prepare the reports, provided any of them be qualified to do so. Now, the weather bureau is certainly able to render the proposed service, provided such legislative or executive steps are taken as will be necessary, no matter who undertakes the work.

If the insular bureau of agriculture can do the task with its present force and organization, it should have the preference to every other bureau, the weather bureau included, but if it is unable to do so, the only bureau which logically and practically can be entrusted with the work seems to be the Philippine weather bureau.

(*d*) The question of expenses. This question is at present, unfortunately, of considerable weight. Some additional expenses will be unavoidable, no matter who undertakes the work—e. g., for stationery and printing. The question can only be, How can they be made as small as possible? It is evident that a small staff will have to be increased to be able to perform the same work which a larger office can execute—without additional clerical help—by simply pressing the actual office force. As [illegible] bur [illegible] divided among many, it is not felt excessively. Should agricu [illegible] nce with the

possibilities of these islands, even the weather bureau will need additional help, but this is a question of the future. In the meanwhile we feel confident that we shall be able to handle the work for several years to come.

IV.—SYSTEM OF CROP REPORTING.

The system of crop reporting, based upon the cooperation of various insular bureaus and the municipal as well as provincial authorities, as proposed by Mr. McCollough on pages 11 to 15 of his memorial to the honorable secretary of public instruction, leaves little to be desired. Only I beg to point out the importance of avoiding the appearance that the cooperating factors are being made in any way subservient to the interests of some particular insular bureau which is to be entrusted with the working up of the reports. To avoid jealousy, which, while not very noble, is exceedingly natural, the latter bureau should appear very much like the secretary of a committee. For this purpose it might be advisable that the reports gathered by other bureaus be not sent directly to the latter, but through the office of the secretary of the interior in case of insular bureaus, and through the executive office in case of the provincial and municipal officials, while the voluntary reports made by teachers should be forwarded through the bureau of education. Even the most punctilious government official can not object to the obligation of reporting to the head of his department. To whom his report is finally referred by said head is no business of the reporter. This arrangement would also afford an efficacious remedy against remissness in reporting. Where the director of the weather bureau could only "very respectfully" expostulate, the honorable secretary of the interior can administer a severe scolding.

I. Who Should Report.

The system of crop reporting on the lines proposed by Mr. McCollough would comprise the following groups of reporters:

A. The Philippine weather bureau.—The crop service of the weather bureau is to be continued as hitherto, but made half-monthly instead of monthly, if possible, with greater insistence upon completeness and promptness of reports.

B. The bureau of agriculture.—Employees and correspondents.

(*a*) Employees: Upon proper legislation, or the request of the honorable the secretary of the interior, the chief of the insular bureau of agriculture should make it the duty of every employee who is in a position to do so to make regular half-monthly crop reports and also extraordinary reports whenever exceptional conditions call for them. Those who are located at fixed stations to report on the crops in their vicinity; those who travel, on the agricultural conditions of the regions traversed, the latter to use the report blanks provided for the provincial officers mentioned below.

(*b*) Correspondents: The chief of the bureau of agriculture should be requested by the same authority to use his influence with the correspondents of his bureau to interest them—and through them also others—in making regular half-monthly reports to the bureau of agriculture, and to give immediate notice of any extraordinary condition which considerably affects agricultural interests. Concerning these correspondents Mr. McCollough says:

"The bureau of agriculture has on its mailing lists the names of prominent Filipinos who heretofore have taken interest in answering inquiries sent out from that bureau and who have displayed some ability and enterprise in agricultural work."

The ordinary reports collected by the bureau of agriculture should be sent twice a month to the office of the secretary of the interior and by same referred to the weather bureau for compilation; extraordinary reports to be forwarded at once upon receipt.

C. The bureau of forestry.—The bureau of forestry is not mentioned by the editor of the Gazette, but it is believed that its cooperation would prove valuable. According to the "Official Roster" for 1904 it has at its disposal 5 foresters, 4 inspectors, 13 assistant inspectors, and 112 rangers. Much valuable material could be collected by means of a personnel so numerous and so widely distributed. As to the collection and transmission of reports, regular as well as extraordinary, the same method should be adopted as was outlined for the bureau of agriculture, with this modification, however, that the rangers forward their reports to the chief through their immediate superior, who is responsible for them to the chief.

D. The provincial and municipal governments.—The law providing for the new crop service should make it incumbent upon every provincial government in the Philippine Islands and the presidente of every municipality to cooperate in the crop service. The presidentes are to fill in the biweekly report blanks for their respective municipality and forward them to the officer of the provincial government whom the governor or the provincial board has designated to superintend the crop service in the province, the latter to be responsible to the executive secretary for the reports of the presidentes. He will fill in a special blank and send it, together with the reports of the municipal officers, to the executive secretary.

who transmits them to the weather bureau for compilation. No additional compensation is contemplated.

Should the financial conditions become such as to permit the appointment of salaried officials similar to the "State statistical agents" of the United States crop service, the islands might be divided into districts and the work of the provincial officers turned over to the " agents," of course with vastly increased duties. * * *

E. The bureau of education.—Upon request by the proper authority the general superintendent of education should invite the American teachers to make regular half-monthly, and eventually special, reports on the crops, etc., in their vicinity, and if possible also to interest their Filipino assistants in the work. The reports are to be forwarded through the district superintendent to the general superintendent's office, which will transmit them to the weather bureau. The cooperation of the teachers should not be made compulsory.

F. Commercial concerns.—Such shipping firms or commercial houses as have agents, etc., in various parts of the islands might be invited to cooperate, though the experience made by the weather bureau heretofore gives little hope of success with the individual agent, unless the firm insists firmly on the matter. These agents would be considered as correspondents of the weather bureau and send their reports directly to the central observatory.

Altogether it is believed that above plan, if strenuously carried out, will result in a crop service which will be quite adequate until the insular government will have its at disposal the wherewith—including above all a large, intelligent, public spirited farming population—to carry out the American system of crop reporting in these islands. But this is a question for some future generation.

2. Collection and Compilation of Reports.

I have the honor of inclosing a copy of the "Weekly Crop Bulletin," published by the Hawaiian weather bureau for the week ending January 7, 1905. Its date is January 9—a speed devoutly to be desired. I need hardly point out that a weekly service is neither possible nor necessary in the Philippines. Neither is it possible to issue the reports two days after the expiration of the period covered by them, unless, indeed, they are telegraphed and entirely different facilities for compiling and printing them are provided. The highest at which we can aim for the present is a half-monthly service. Nor will it be possible to issue the reports earlier than three to four weeks after the period to which they refer.

A. The officials reporting directly to the chief of a bureau should mail their reports at the latest on the 15th and last of the month.

Those who report through some other official, as municipal presidentes, teachers, and rangers, should be required to send their reports sufficiently early to enable the latter to forward them on the dates mentioned, even if it were necessary to fill in the blanks as early as the 7th and 23d, respectively. The greatest insistence is to be made upon promptness, for the habit of procrastination can hardly be anywhere more fully developed than here. The blanks should contain a rubric calling for the day of mailing, and if the intermediate officials could be furnished with a "time stamp" to be stamped upon every report when received, a good control would be possible.

The bureau of agriculture and the forestry bureau should be required to forward the reports collected by them—those covering the first half of the month not later than the 27th of the same month, those covering the second half not later than the 12th of the month following, allowing thus twelve days for the transit from the provinces to Manila. The executive bureau and the bureau of education should likewise be requested to place the reports transmitted to them at the disposal of the weather bureau not later than the 13th and 28th, respectively, of each month, on which dates the reports of the other bureaus sent through the office of the secretary of the interior will probably reach the weather bureau. Of course it will be impossible to secure the reports from all parts of the islands—some will not arrive until four to six weeks later—but sufficient material will be on hand to give a fairly correct idea of crop conditions in the Archipelago.

Habitual neglect of official reporters, as far as it is not corrected by intermediate officers, will be reported to the chief of the bureau to which the offender belongs, said chief to remedy the evil.

B. To formulate a detailed scheme for the compilation of the crop report is of little value until the features of the service are determined. In a general way it may be suggested that the report should take the form of two-page tables, of which the first vertical column contains the names of the provinces or districts, opposite which are placed, under appropriate headings contained in the first horizontal column, the state of the principal crops and the prevailing weather conditions. If the latest report on hand for a particular province refers to the period immediately preceeding the one which appears at the head of the table, this fact is indicated by 1 asterisk, if 2 periods late, by 2 asterisks, etc. A wide column is to be reserved for remarks. The question whether the report should also contain the Spanish, and native names respectively, of the crops (in small print) besides the English, is worth considering.

Since the compilation of the report is to be made by the office force at present at our disposal, in addition to the work already performed, ten days at the very least must be allowed for it. Hence, provided the reports of the various reporters reach the weather bureau on the 13th and 28th, the final crop report for the first half of the month may be finished in manuscript by the 10th to 13th; that for the second half by the 24th to 27th of the month following the one to which they refer. This is highly unsatisfactory, but I do not see how greater speed can be secured under the given conditions. The weather bureau will certainly do whatever is possible, but it must be remembered that its capacity for work will be taxed to the limit.

3. Publication of the Report.

A. Cablegrams.—In compliance with the suggestion of the Washington authorities, a cablegram might be prepared reporting the state of the principal crops which are of commercial importance to the United States, said dispatch to be forwarded to the Bureau of Insular Affairs by the honorable executive secretary. A code or cipher could easily be arranged to keep cable expenses within a reasonable limit.

B. Printed bulletin.—The finished manuscript of the final crop report is transmitted to the honorable, the secretary of the interior, or, if necessary, toward the desired effect, to the office of the honorable, the governor-general, who after special arrangement with the bureau of public printing will order immediate printing. Making the requisition "special" has not the desired effect.

4. Distribution of the Crop Report.

(a) The bureau of insular affairs: As many copies as the chief thereof may direct.

(b) The insular government: As many copies as proper authority may order delivered.

(c) The various insular bureaus: Those cooperating in the service, as many copies as the chiefs thereof may desire. It will be necessary that each bureau mail the report to the persons reporting to it, otherwise the additional work thrown upon the weather bureau would be too immense.

(d) The official designated in each province to superintend the crop service of same: As many copies as he requires. He will distribute the report to the presidentes and to other persons who may apply.

(e) The bureau of education: As many copies as may be required. If preferable, the reports may be sent directly to the district superintendents, as their number is not very great.

(f) All persons residing in the Archipelago who are on the distributing list of the weather bureau and not already included in the preceding classes.

(g) All persons who may apply for it.

It appears that the more prominent features of the new crop service have been set forth. Naturally there will be an immense amount of detail to be settled when the system is put to a test. As proposed, it has its grave defects, the most salient being the comparative slowness and the impossibility of uniting all cooperative factors under one executive head. However, there seems to be no remedy, at least not for the present.

Very respectfully,

José Algué, *Director.*

Conclusion.

As it probably will be gratifying to you to learn of the success of the weather bureau at the World's Fair, St. Louis, Mo., as far as this success can be judged from the prizes received for exhibits, I beg to conclude this report with a list of the awards obtained: Grand prize, for the large relief map (110 by 75 feet) of the Philippine Archipelago; grand prize, for the model meteorological station; grand prize, for new meteorological instruments invented by Rev. José Algué, viz, the baro-cyclonometer and the refracting nephoscope; gold medal, for the improved microseismograph constructed by the mechanics of the weather bureau; gold medal, for a collection of various maps exhibited by the observatory; gold medal, for the seismographic pendulum invented by Rev. Mariano Suárez, S. J. silver medal, for publications of the bureau; three silver medals, the employees who executed the maps, Román Trinidad, Gervasio de Guía, Ramón Navarro.

Besides there were awarded to the observatory two gold medals, 3 silver medals, 1 bronze medal, and 1 "honorably mentioned" for various objects exhibited, which have no connection with the official work of the observatory.

Very respectfully,

Miguel Saderra Mata,
Acting Director.

Secretary of the Interior,
Philippine Government, Manila, P. I.

APPENDIX M.

REPORT OF THE ETHNOLOGICAL SURVEY.

DEPARTMENT OF THE INTERIOR,
ETHNOLOGICAL SURVEY FOR THE PHILIPPINE ISLANDS,
Manila, September 1, 1905.

SIR: I have the honor to submit the fourth annual report of the ethnological survey for the Philippine Islands.

The appropriation made for the survey one year ago authorized the employment of three men to do scientific work, an increase of one man for work in ethnology over any previous year since the organization of the bureau. Owing, however, to the absence of the chief at the exposition in St. Louis and his subsequent resignation, we have had the services in the islands of all three men for only six months of the twelve of the past year. But we have succeeded in doing work both in the office and in the field which we believe to be of value.

The acting chief of the survey has been in the field about five and one-half months in four different parts of the islands. Mr. Christie spent about the same length of time among the people of the Zamboanga Peninsular. The remainder of the time of the officers of the survey has been spent in office work connected with publishing the results of field work and in arranging photographic and other collections.

WORK OF THE CHIEF OF THE SURVEY.

At the time the third annual report was submitted Doctor Jenks was in St. Louis on duty at the exposition. In the building devoted to Philippine ethnology he installed the ethnologic exhibit sent from the islands and remained in charge the greater part of the time the exposition was open. This exhibit was so extensive and so well arranged that it attracted a good deal of attention from visitors to St. Louis. The interest thus encouraged in the United States about the people of the islands has continued, as is shown by letters received in this office making inquiries about publications issued by the survey, and, although very little of the influence exerted by such exhibits and by publications is immediately apparent, it is nevertheless continuous and far-reaching.

Doctor Jenks was instructed to select before leaving St. Louis all the articles illustrative of the ethnology of the islands which he thought should be sent back to Manila. In accordance with these instructions he selected the best of the exhibits to form a nucleus for an ethnological museum. January 13 he arrived in Manila and at once took up work on his paper, "The Bontoc Igorot." This had been long delayed, owing to his absence in the United States and the necessity for sending the proofs to him, but it had reached page proof, and, after a few final changes, it was sent to press.

A few weeks after his return to Manila Doctor Jenks was taken seriously ill, and for nearly a month was unable to come to the office. When he had partly recovered, so that he could again be at work, he began revising a paper by Dr. Daniel Folkmar, lieutenant-governor of Bontoc. Doctor Folkmar had a long training in anthropological work and was in the employ of the Philippine exposition board from the time of his arrival in the islands until November, 1903, when he was appointed lieutenant-governor of Bontoc. In accordance with Act No. 955, Philippine Commission, an agreement was made, November 23, 1903, between Doctor Folkmar and the chief of the survey by the terms of which the former was to furnish a paper each year on specified subjects dealing with the people of his province. As Doctor Folkmar was not connected with this office, he was to be paid for these contributions to the work of the survey in addition to his salary as lieutenant-governor. The paper on the Tinglayan culture area was submitted in January of this year.

After a few months Doctor Jenks decided that for reasons of health he had better return to the United States; he therefore resigned August 3, of this year, and the following day sailed for home. As soon as he has entirely recovered his health he will again take up work in ethnology, probably somewhere in the United States.

WORK OF THE ACTING CHIEF.

The necessity of looking after publications which are under way has kept me in Manila more than half of the year and has prevented my making any extended investigations in the provinces. I have, however, made five separate journeys from Manila, but no one of them has kept me away more than six weeks.

In September I accompanied the secretary of the interior and the chief of the mining bureau on a trip to Culión. While the secretary was engaged in business connected with the leper colony, the chief of the mining bureau and myself made the circuit of the island called Peñon de Coron. This lies south of Busuanga and east of Culión and is near to both. It is one of the boldest and rockiest islands in the Philippines. We hoped to see something of the people who live on the island, but the coast line is so rocky and abrupt that there are few places where any beach has formed, and we saw but two or three evidences of occupation. At one point on the north coast where a small stream empties into the ocean we could see on the hillside a few rude shelters. We landed and went up to them, but we saw no people. There were live coals in two of the houses, from which we concluded that the owners had been gone probably not more than an hour or two. These huts were very small, raised from 2 to 5 feet above the ground, and open on one side. They were surrounded by fields of camotes. We do not know the character of the interior of this island, but it is possible there may be narrow valleys where small groups of people have made their homes. The island is remarkably rough, not only along the coast but apparently also in the interior. We know as little about the people who inhabit the island as about the island itself, although they are probably Tagbanuas.

A day or two later we saw on the island of Busuanga a few Tagbanuas. They were well-formed people, below the average in stature, with very dark skin and closely curled, if not kinky, hair. It may be that the ones whom we saw had some Negrito blood in them. If so, the closely curled hair would be explained.

Almost two years ago the provincial board of Ilocos Sur asked to have a representative of the survey sent to the province to see if the Tinguians who live there could, with due regard to the interests of all concerned, be brought under the municipal code. All tribal distinctions in the government of the people of the province would thus be done away with.

It was not until November 1, 1904, that we were able to send anyone to report on the question. At that time I went to San Fernando de Unión and from there traveled through a part of Unión, through Ilocos Sur, and as far north as Paoay, in Ilocos Norte. I went to many of the Tinguian rancherías in Ilocos Sur and Ilocos Norte to find out the condition of the people and to see whether they wished to come under the municipal code as applied to other people in the two provinces. To this proposal to do away with tribal lines in the provincial government I found decided objections, the desire of the Tinguians being to remain distinct in their government from the Ilocanos, although they did not object to paying the same taxes as those which are paid by the Christian peoples. Provision was made in Act No. 1306, Philippine Commission, annexing the province of Abra to the province of Ilocos Sur, by which the wishes of the Tinguians in this matter were met.

At Badoc I saw two albino women and one albino man, said to be unrelated to one another. Their skins were as fair as those of fair white people, excepting in certain small splotches on the neck and shoulders where the natural color of the skin appeared; their hair was white and their eyes sensitive to the light. I was told that there were a good many albinos living on a small island off Santo Domingo in Ilocos Sur, but I can not vouch for the truth of the statement.

After looking into the question of government of the Tinguians, I went up to Bangued, Abra, thence to San José, near which place I came across a small group of Negritos working for their Filipino neighbors. They appeared to have been much in contact with the surrounding Ilocanos and to have lost that timidity which the Negrito usually shows in the presence of strangers. This little group of black people evidently had some Filipino blood mixed with the Negrito.

From San José I went by way of the Butloc Valley to Ituy, thence over the divide to Balbalasan, and so on to Labuagan and Bontoc. From the trail on the mountain side just beyond Ituy leading across the divide there is a beautiful view of the valley, the little settlements, and the cultivated fields. The customary dress of the Tinguian man when traveling includes a round hat, a rain cape, which covers a basket in which a few necessary articles are carried, a spear for defense, a breech-cloth, and sometimes a shirt. From San José to Labuagan I was unaccompanied the whole distance, excepting by native guides and carriers from town to town. Everybody along the way seemed entirely cordial and friendly.

This, in all probability, is generally true so far as white people are concerned, although I was advised by Americans living in Bangued not to undertake this journey alone, and I am inclined to believe, from what I heard before I started, that such a trip would not always be safe for Filipinos.

The Tinguians, through whose country I was traveling most of the time until I reached Labuagan, are industrious, thrifty, and peaceable people. The dividing line between the Tinguians on the west and the Igorot on the east is between the towns of Balbalasan and Labuagan. Guinaang, which lies between these two towns, a little nearer to Labuagan, is influenced in culture by the people on either side. Many of the Tinguians raise larger and better crops, and are in better condition, generally, than their Ilocano neighbors. The fact that they were anxious to remain independent of the Ilocanos may have indicated an indefinite fear of the latter, but quite as likely, also, a simple desire to remain independent. I returned to Manila from Bontoc by way of Cervantes, Baguio, and the Benguet road.

Late in January the delegations of tribes from the Philippines returned from St. Louis. Mr. Wax, who went to the exposition with the Lanao Moros, did not return with them. Mr. Calhoun, who was in charge of the Bagobos, died in St. Louis. Mr. Lewis, who went in charge of the Samal Moros, came back in charge of the Samal Moros, Bagobos, and the Lanao Moros. It was thought that it might be necessary for some one to go with the Bagobos from Zamboanga to their homes in Dávao, as there was a possibility that Mr. Lewis might be detained with the Samal Moros when he reached Mindanao. I therefore left Manila for Zamboanga January 24 and, although when I arrived there Mr. Lewis found that he could without inconvenience accompany the Bagobos to their homes, I went on to Dávao myself to visit some of the hill tribes in that province.

The people whom I saw most in the two weeks I spent in Dávao were the Bilans, a tribe living in the hills some 15 miles south of Santa Cruz. These people dress very much like the Bagobos and other people of that region. They are much like them in general appearance as well. The men wear short, tight-fitting trousers made of abacá and short jackets made of the same material, similar to those worn by the Bagobos, Manobos, and other tribes, although the dress of the Bilans is not as elaborately ornamented as is that of the Bagobos. Bilan women closely resemble in appearance Bagobo women, although they do not usually dress as elaborately. The Bilans live for the most part back from the coast and seem to prefer the hills for their homes to the coast region. At the present time there is nothing to be feared on the coast, though very likely not many years ago the hills were safer.

The people of all the Dávao district are peaceable and orderly, with the possible exception of those living in certain remote regions in the hills. Traveling is safe anywhere. There are a few Moros living about the shores of the Gulf of Dávao, but they are Moros in name more than in religion, if one may judge from casual observation. I believe there is no communication between them and their nearest Moro neighbors, the people of Cotabato. The few glimpses that members of this bureau have had of the district of Dávao lead them to believe that from the point of view of ethnology it is one of the most interesting regions in the islands, but we have not yet been able to make a detailed study of the district.

On my return from Dávao I remained in Manila a little over a month, and on the 15th of April started for the island of Panay to find out the character of the population and to determine what tribes, if any, other than Visayans occupy the island.

Starting from Iloílo I went first to Cápiz by way of Janiuay, Tapas, Dao, and Dumalag. I made two attempts to go across the hills into the province of Antique, but owing to the activity of the ladrones and of the constabulary I could not find a man who would admit that he knew the trails. The trails into Antique from the provinces of Iloílo and Cápiz are said to be difficult, but inasmuch as some, at least, of them are quite often used by native traders who wish to exchange weapons and agricultural products, I suspect that there is nothing extraordinarily difficult about the journey. It is, of course, possible while the ladrones are active that one might be interfered with, although I am inclined to think that one white man traveling without a guard would be reasonably safe.

At Calinog the fear of ladrones was so great that the house used as headquarters by the town police had a high bamboo fence around it to guard against surprise. I noticed also along the road from Lambunao to Tapas several houses similarly barricaded. Within these barricades it was customary to collect all the carabaos and other domestic animals at night, as otherwise there was great danger of their being stolen. Along the roads traders and others are often accompanied from town to town by from two to six men of the municipal police.

From Cápiz I went by way of Mambusao and Jagnaya to Jamindan, a small town back toward the hills, and from Jamindan over the mountains to Libacao. This journey from Cápiz to Libacao took me through a part of the country occupied by mountain peoples. The most careful inquiry, both here and in other parts of Panay, failed to discover any people other than Visayans, with the single exception of Negritos. The people in the mountains seem less civilized, less accustomed to dealing with other people than those of the lowlands; their dress is a little more primitive, but they are like Visayans in general appearance. I believe there are some people living higher up in the mountains than any point which I reached, among whom the men wear long hair. I can not be certain about this, though there is nothing improbable in the report. In the interior of other islands, as Mindanao, Mindoro, and Luzón, the custom prevails among men as well as among women of wearing long hair.

These mountain people make and use a bolo which is characteristic of that region. It has a blade about eighteen inches long with a straight edge, slightly wider toward the end than at the hilt. The end of the handle is elaborately and neatly carved, usually in the form of a grotesque face with a long sharp nose, sometimes almost long enough to be called a trunk. The sheaths are also carved, and some of them have a fine cord made of human hair wound about the upper end. These bolos are not as common as they were a short time ago, because many of them have been collected by the constabulary. Weapons from this region find their way across the hills into the province of Antique, in the neighborhood of the town of Colasi and elsewhere, thus showing that there is communication more or less frequently between the people on the two sides of the hills.

From Libacao I went down the Aclan River to Calivo, and from there continued on by way of Buruanga to Pandan, in the province of Antique. After leaving Cápiz I made repeated inquiries for Negritos all the way to Iloílo. They are an elusive people. The Visayans living near them are usually unable to tell one just where they may be found.

On the island of Buracay, opposite the barrio of Caticlan, between the towns of Navas and Buruanga, live a considerable number of these little blacks. They gain their livelihood mainly by working for the Visayans who live on the island. They do not appear to be as timid as many of the Negritos in other parts of the Philippines, probably because they have been working for these Visayans for some time. In general appearance they are like Negritos elsewhere in the islands. On the island of Carabao, which is considerably larger than Buracay and which lies almost due north of the latter and is some distance farther away from Panay than is Buracay, there are said to be a good many Negritos. Very likely the two islands were stepping stones for the Negritos in passing from Panay to Tablas and possibly also in reaching Mindoro, northeast of Panay. Judging from the appearance of many Manguians in Mindoro, I think that there is little doubt that there were at one time Negritos on the island, even if there are none now.

Leaving Pandan I continued on down the coast to San José de Buenavista. At Colasi, about halfway between Pandan and San José, I found a considerable number of Negritos living in rude huts on the land of a Spaniard for whom they were working. Very few of them were of pure blood. Most of them had hair which was wavy or curly, but not kinky, while one woman who was no darker than the average Filipino had hair which was not only straight, but light in color, with a streak of reddish-yellow hair in front. Her features, also, as well as those of several others in this party, were by no means those of the Negritos. In explanation of these facts I was told that some Filipinos who like the lazy life of the Negritos, and who are glad to avoid paying taxes, go to live with the little black people and intermarry with them. This is entirely reasonable and is probably true.

In the neighborhood of San José, about three hours' walk, is a little settlement of Visayans and Negritos on one of the roads, though not the most direct, from San José to San Joaquín. When I reached this settlement the Negritos were away in the hills, and although I sent out a messenger to find them they were so far away that I could not wait for them to come in. Besides the Negritos thus far mentioned, there is a considerable body of them in the basin of the Sibalom River in this same province of Antique. There is also another small group in the neighborhood of Lambunao, province of Iloílo, and still others scattered about in the mountains of the provinces of Cápiz and Antique.

By far the greater part of this journey which I made from Iloílo by way of Cápiz, Calivo, Pandan, and San José to Iloílo again was on foot. Horses are scarce, and those who have them usually do not care to rent them. There was formerly a good wagon road from Pandan the entire length of the province of Antique as far as San José. Parts of this road still remain, and it is continuous from Bugason to and south of San José.

In traveling through the provinces of Iloílo and Cápiz one is struck by the great stretches of level, fertile land. Before the revolution it is said to have been a very productive region. It is encouraging to hear even now of the steady, even though slow, progress that is being made in agriculture. The great trouble here as elsewhere is the lack of carabaos.

Antique, especially at its northern end, is narrow and offers comparatively little opportunity for agriculture. The southern end is considerably wider and was formerly a prosperous region. Here, too, are some indications of improvement in industrial conditions.

Late in May I returned to Manila, and on July 1 I left for Misamis. In this visit to Misamis there were two objects in view. First, to learn the wishes of the people of the interior on the boundary question which had arisen between the provinces of Cotabato and Misamis; second, to find out in so far as was possible in a hasty visit what sort of people the so-called Montescos, or Bukidnon, are.

I was away from Cagayán de Misamis, the capital of the province, for ten days. The Bukidnon are apparently a distinct tribe, separated in language and in customs from their Visayan and Manobo neighbors. They are slowly coming to be more like the Visayans in customs and in dress, and many of them are Christians. Many of them, too, can talk Visayan, and make frequent journeys to Agusan or Cagayán to sell hemp or other products and to buy rice and cloth. They formerly wore, and still wear in some parts of the province,

a characteristic dress, both that of the women and that of the men being made of many pieces of variously colored cloth sewed together into an intricate pattern. As among most barbarous peoples, red is the favorite color.

They have no other name for themselves than Bukidnon or Montesco. The latter is, of course, a Spanish name, the former Visayan. Bukidnon is a name given to mountain people in Negros and other islands, so it may be that formerly these hill people of Misamis had a specific name for themselves other than Bukidnon. If they did have, they have lost all trace of it and have adopted the Visayan name. They are a peaceable, orderly, and fairly industrious people whose chief industries are raising hemp and coffee. They extend on the south to the Pulangi River in the neighborhood of Sevilla; they are limited on the west by the mountains which form the dividing line between Misamis and Surigao, and on the east by the mountains between the Cagayán River and Lake Lanao.

So far as the boundary matter was concerned I found it impossible to determine without an instrument where the line between Misamis and Cotabato runs, but it seems as likely that the towns in question are in one province, as that they are in the other. All the people of those towns are anxions to be in the province of Misamis. Late in July I returned to Manila and since that time have been engaged in office work.

WORK OF MR. CHRISTIE.

At the time of writing the last report Mr. Christie was translating from Spanish into English a series of papers bearing on northern Luzon and in doing other office work. No definite decision has yet been reached about the publication of these papers. In January, 1905, Mr. Christie was sent to Zamboanga to make a study of the Subano people. He had been among these people before, and was therefore somewhat acquainted with them. It was believed that they would furnish an interesting example of the pagan population of Mindanao and would also illustrate the effect of the contact of Moros with a less advanced people. Mr. Christie returned from this visit among the Subanos in July of this year and is now engaged in writing a report of his work in Mindanao, which will appear in an early publication of this office. A brief summary of his investigations accompanies this report.

WORK OF PUBLICATION.

We are now bringing into permanent form the results of the work of the employees of this bureau for the past few years. The status of our publications at the present time is as follows:

Volume I, The Bontoc Igorot, by Albert Ernest Jenks. After a long and unavoidable delay this paper was published in April of this year.

Volume II, Part I, Negritos of Zambales, by William Allan Reed. This paper was published in February of this year.

Volume II, Part II, The Nabaloi Dialect of Benguet, by Otto Scheerer. In this first attempt to write the Nabaloi dialect it may well be imagined that some difficulty was felt in expressing certain peculiar sounds. Mr. Scheerer has, I believe, met this difficulty as well as any one could. He has seen the proof of his paper, and work on it has been completed excepting the printing of the index.

Volume II, Part III, The Bataks of Palawan, by E. Y. Miller. These people were formerly referred to as the "Bataks of Paragua," but as the name of the island on which they live has recently been changed to Palawan by an act of the Commission they will, of course, henceforth be known as the "Bataks of Palawan."

Volume III, Spanish edition, Relaciones Agustinianas de las Razas del Norte de Luzón, arranged by R. P. Fr. Angel Pérez. This volume was published in July of this year. It has been somewhat difficult to reach a decision about the English edition of this book for the reason that such a large proportion of it deals with church missions and their history and is not of general interest. We may decide to include in the English edition of such parts of this as it is thought best to publish translations of other missionary writings bearing on the tribes of the islands.

Volume IV, Part I, History and Laws of the Moros, by N. M. Saleeby. The proof of the first part of Doctor Saleeby's Moro studies, dealing with the first 15 of the 33 manuscripts belonging to the survey, has been received from the printer. It is expected that this part will be published within two months. Doctor Saleeby thought it best to include in the second part of the volume the account of the Moro tribes, their languages, and the districts which they occupy, an outline which it had been expected would appear in the first part. The second part will be published soon, Doctor Saleeby having written me that it was approaching completion.

Volume V, Part I, The Tinglayan Culture Area, by Daniel Folkmar. This study of a section of country occupied by Igorot, and immediately adjoining the Bontoc Igorot, with

whom Doctor Jenks deals in his paper, will furnish a means of comparing the culture of two neighboring and closely-related divisions of one tribe.

Such comparisons lead to a better understanding of a given tribe and enable one to deal with them in a more intelligent and satisfactory way.

MUSEUM OF ETHNOLOGY.

As stated in the last annual report, most of the articles belonging to the museum of ethnology were sent to St. Louis to be exhibited in the Philippine section of the exposition. While Doctor Jenks was in St. Louis he designated a large amount of the ethnological material to be returned to the Philippines to form the beginning of an ethnological museum. Most of the articles so selected were sent to Manila. It appeared later, as I have been recently informed, that some of those which he asked to have returned belonged to private exhibitors, to whom they were delivered at the close of the exposition.

Unfortunately a good many of these articles which have now been delivered to us are without numbers or labels of any kind. Some of them we can identify; some, in all probability, we can not. The value of the latter as museum specimens, is of course, materially lessened. There are included in these unlabeled articles some which will probably have to be returned to individuals who loaned them for exhibition at St. Louis. Claims are now coming in from people who have not yet received the articles which they loaned to the exposition board. It is feared that some of these things have been lost. If this is true it may be necessary to use some of the materials intended for the museum to make good these losses.

The only space which we have at present to use for a museum of ethnology is on the third floor of the Oriente building. We have one large room with 1,350 square feet of floor space, and a hall with about 900 square feet. In this large room 5 shelves, having a width of 20 inches and a total length of 61 feet, have been placed in order that we may care temporarily for articles to be exhibited later when provision has been made for cases. It is earnestly hoped that when the finances of the insular government permit a museum building will be built, which will provide for the care, not only of the articles which we have now, but of all those which we may acquire for many years to come. While I understand very well that there are other things which demand attention more imperatively than does a museum building, and that the resources of the insular treasury are at the present time somewhat limited, I believe that I do not overestimate the importance of a museum when I say that it is one of the most valuable means of education known. A museum which will illustrate the customs, homes, dress, and general culture of the tribes of the islands will show conditions in the provinces as nothing else can and enable one to learn in a few days what it would require many months of travel to find out.

THE COMMERCIAL MUSEUM.

The work of the commercial museum during the past year has continued along the same lines as during the previous year. The number of exhibits has increased and there are more requests for space than the present capacity of the commercial museum will permit us to grant. The belief grows stronger every year that the commercial museum with proper space and the necessary financial support will be able to do valuable work in promoting trade between the United States and the Philippine Islands and between the Philippines and foreign countries. The report of Mr. Samuel B. Shiley, who is in charge of the commercial museum, is appended to this report.

THE NATURAL HISTORY MUSEUM.

Mr. McGregor, the collector of natural history specimens, and his two assistants were transferred in November, 1904, to the bureau of government laboratories. The reasons for this transfer were, first, that the scientific library of the government had been concentrated in the laboratory building; second, that almost all of the biological work being done by the government bureaus was in the laboratory building, and it seemed, therefore, to be the proper place for Mr. McGregor and his assistants.

TRIBES AT ST. LOUIS.

In January, 1905, all the representatives of the non-Christian tribes who had been sent to St. Louis returned. These were the Negritos, the Igorot, the Tinguians, the Lanao Moros, the Samal Moros, the Bagobos, and the Manguians. At least one from each of these groups, except the Samal Moro, had died in St. Louis or on the way thither The rest of them returned well and apparently much pleased with their experiences during their absence from the islands. Two other parties of Igorot went later to the United

States to be exhibited at the Lewis and Clark Exposition at Portland, Oreg. These parties were in charge, the one, of Dr. T. K. Hunt, who had been at the St. Louis Exposition with the Igorot, the other of Mr. R. Schneiderwind, who had been connected with the Visayan village at St. Louis. The ease with which these people could be secured from one of the same tribes which were represented at St. Louis shows as plainly as anything can that they were well satisfied with their treatment while at the exposition.

THE WORK OF THE COMING YEAR.

It was stated in the last annual report that it was expected that one member of the survey would be in the field practically all the time, and two during a considerable part of the year. The first part of this hope was realized, and the second would have been had it not been for the absence of the chief of the survey at St. Louis. It was further stated that an expedition was planned to explore the northeastern part of Luzón. This might have been done, but we learned that in all probability the entire population of that region was Negrito. It was, therefore, thought that our time might be better spent elsewhere. The expedition to Panay was substituted for the proposed one to northeastern Luzón.

No further investigations have been made on Mindoro or Palawan, but instead a careful study has been made, as already stated, of the Subanos of the Zamboanga Peninsula. The expedition to Misamis suggested in the last report was made and the necessary information secured. On account of pressure of other work only a little progress has been made on the proposed comprehensive description of the tribes of the Philippines.

It is, however, hoped that not many months will elapse before this can be submitted to the printer.

For four years we have been gathering information which will enable us to show graphically the territory occupied by the various tribes. We have now reached the point where we can make a map of the islands indicating with a fair degree of accuracy the dividing lines between the tribes. This map will be prepared within a few months, and if the cost of publication is not too great it will be printed in colors. The usefulness of such a map is at once apparent.

We hope before long to undertake a careful study of the general culture of one of the great Christian tribes, probably of the Ilocanos or Vicols. This study would require more time and care than a similar study among the uncivilized tribes. Many things which one would need to know would not appear on the surface and would have to be learned by patient inquiry. The particular reason why we want to make a study of one of the Christian tribes is to furnish a contrast to the uncivilized pagan on whom we have thus far reported. It is hoped that a beginning at least may be made during the coming year.

I believe there are not many who realize the importance of having a representative of the central government travel about in the less known and the less visited parts of the islands. The work of the survey takes us where white men rarely go. We thus have an opportunity of telling the mountain people that the government is interested in them and knows what they are doing. The very presence of a government official among them proves the statement. When I first went into the interior of Surigao the people there told me that they did not know whether the government was Filipino or American, but that they were willing to come in from the hills and live in town if they could feel safe. News travels slowly in the provinces. Oftentimes the people do not care to follow the advice of their presidentes, however good the advice may be. I have more than once been appealed to as a representative of the government to sustain the presidente's authority. In this connection attention is especially invited to the accompanying report by Mr. Christie of his travels among the Subanos. These facts only show that the mountain people need to see a representative of the central government to be assured that it still exists. I may add, too, that the survey has been asked several times to make investigations with special reference to immediate legislation affecting the non-Christian tribes.

It remains only to add that as we learn more and more about the people of the Philippines the belief is strengthened, first, that we have an unusually interesting field for ethnological investigation; second, that while it takes time to gather information which is reliable, we have now reached the point where there will be little delay in the production of reports dealing with various tribes of the islands; third, that these reports will furnish the best means for making the people of the Philippines known to those who can not travel about the islands, and so simplifying gradually but surely the problem of government.

I would like, in conclusion, to refer to an article recently published in the proceedings of the American Political Science Association. The writer is discussing colonial autonomy with special reference to the Philippine Islands. His criticisms are calm and judicial. He believes that in order to adapt western institutions to eastern conditions we need to know the point of view to understand the way of thinking of the eastern man. He adds: "No attention is being given to the more intimate history and traditions of these populations. Their folklore will be abandoned and destroyed." The work of the ethnological survey

had evidently never come to the writer's attention, for it is precisely "to the more intimate history and traditions" of the people that we are giving our attention. I am sure that everyone who realizes what we are doing in the line of investigation will realize at the same time that this work is absolutely necessary for an intelligent and successful administration of the government.

Very respectfully,

MERTON L. MILLER,
Acting Chief.

The SECRETARY OF THE INTERIOR, *Manila, P. I.*

REPORT OF MR. CHRISTIE'S VISIT TO THE SUBANOS.

THE ETHNOLOGICAL SURVEY,
Manila, September 1, 1905.

SIR: I have the honor to present herewith a summary of my field work during the present year.

On February 4 I left Manila for Zamboanga with the intention of studying the Subano tribe, which occupies the greater portion of that part of Mindanao lying west of the Spanish trocha connecting Panguil and Illana bays.

On arriving at Zamboanga the limited time for the investigation made it impracticable to attempt to study the whole Subano field and necessary to select some particular region for investigation. The west coast was chosen for this purpose, and an attempt was made to find the culture center of the region in order that I might spend most of the time assigned to the investigation in one place. It seemed probable that such a center or typical community might be found about Sindangan Bay, for this region seemed likely, because of its distance both from Dapitan and from Zamboanga, to have escaped the impress of foreign influences brought to bear through Spanish priests.

Through the courtesy of Gen. Leonard Wood the voyage to Sindangan Bay was made on a chartered transport. A landing was made near the mouth of the Sindangan River, and from this place as a center journeys were made to many surrounding rancherías as far as Siari on the north. The Sindangan River, known to the Subanos as the Gikwan in its upper course, was followed to its junction with the Piau. The Piau was also followed until the dividing line was reached between the relatively civilized Subanos living among the hills near the coast, especially along the lower courses of the small rivers of the region, who have been influenced by the Moro civilization through their large trade in rice, and the much more primitive Subanos living in the highlands, and consequently called by the former people tau tasan or highlanders. It was my original intention to penetrate among the latter for purposes of comparison with the more civilized Subanos, but I was assured by the most intelligent natives that the highland Subanos would run away on my approach and that it would be impossible to learn anything of value. As this statement was fully borne out by the conduct of the few highlanders met with, it was considered best to leave instructions with a certain chief to prepare the neighboring highlanders for a visit to be made after a few weeks. This chief enjoyed a wide influence on account of his position as head war chief of the Sindangan Subanos during the last raids of the Lanao Moros into the region, and was married to two sisters from the highland people. He was authorized to expend a small amount of trinkets and cloth for me for this purpose. After about five weeks had been spent in the Sindangan Bay region, it seemed best to return to Zamboanga, stopping on the way to go up several of the intervening rivers in order to compare the culture of the Subano rancherías of the remainder of the west coast with that of the Sindangan Bay rancherías.

The six weeks spent on this first trip to Sindangan Bay were, on the whole, very fortunate. An unusual number of festivals which took place in the region during this time brought together hundreds of Subanos and offered special opportunities for the study of their social life and certain aspects of their religious beliefs.

On the return journey to Zamboanga it was found that the culture of the Sindangan Bay region could not be taken as typical of the whole west coast. Beginning at Patawak, a short distance south of the bay, so many deviations from the Sindangan Bay customs were to be seen—such, for example, as the prevalence of the practice of circumcision in the region from Patawak south and its rarity or absence in the rancherías of Sindangan Bay—as to give a somewhat different complexion to the culture of the two regions.

On returning to Zamboanga I found that a steamer was about to leave for Margosa-Tubig, on Dumanquilas Bay, and would return within a week. It seemed a good opportunity to spend a few days in comparing the Dumanquilas Bay Subanos with those I had already seen at small cost of time. It was also desired to compare the statements of the Dumanquilas Bay Subanos concerning their relations with the Moros with the statements I had already recorded on the west coast. On arrival at Margosa-Tubig the principal

Subano chief of the region was found to be at the fort, and I accompanied him on the same day to his ranchería across the bay. Three days were spent at his house. The host invited in a number of chiefs from the surrounding country, and they responded cordially, one or two of them being from the Lake Wood region.

On returning to Zamboanga it was deemed best to spend a month at the Subano settlement of Patalun, a village near Zamboanga established by the efforts of the Spanish Government, to study the dialect and to write down certain Subano folk stories, for the gathering of which the place offered excellent opportunities. The headman of this village is desirous of having an American public school among his people, and partly for the sake of the school work of the future, partly in order to produce something a little more illuminating in the way of linguistic work than mere lists of unconnected words, Arnold's First Reader was translated into the local variety of the Subano dialect.

After the stay at Patalun the journey was continued to Sindangan Bay in a Moro sailboat. The voyage proved to be of exceptional slowness and difficulty on account of continued bad weather, which made it necessary to take refuge several times in the river mouths along the coast. These enforced delays, however, afforded an opportunity to meet the Subanos of many different rancherías, and although it was rarely possible, on account of the timidity and reserve of these people, to secure valuable data through conversation during these brief visits, something was learned of the manner of life of the natives in the whole region from Zamboanga to Sindangan Bay.

On arrival at the mouth of the Sindangan River it was found that smallpox had broken out in the back country, and that the Subanos, according to their custom, had established a quarantine against the infected region. Hence I had to abandon the trip to the Piau River, where I had intended to spend several weeks, both because the culture of the partially civilized natives of its lower course is highly typical of that of all the Subanos living near the coast of Sindangan Bay and because of the accessibility from there of the country occupied by the highlanders. The return to Zamboanga was made with the same difficulty as the outward voyage for the same reason.

On returning to Zamboanga a brief report of what had been learned about the smallpox situation was made to the district governor at his request.

To sum up the results of the trip: Extensive notes were taken upon the usual topics of investigation in work of this kind, such as the language, religion, and economic condition of the people. And besides this, definite information was obtained concerning the amount, kinds, and manner of collection of the tribute paid by the Subanos to their Moro suzerains of the Sibugay Bay and Magindanao regions, and concerning the nature and extent of the restrictions suffered by the former. Data were also gathered that give an approximate idea of the extent and nature of the injury suffered by the Subanos at the hands of Iranun raiders and Samal pirates. It is believed that a knowledge of relations existing between Subanos and Moros prior to American occupation will be of use not only in explaining the present condition of the Subanos, but in understanding the rôle of the American Government in the Philippines.

In addition to the opportunities for scientific work offered by this tour of field work there were many occasions for explaining to the people of the hills the purposes of the American Government toward them. The greatest curiosity, often mingled with apprehension, was shown by the Subanos concerning the motives and possible results of the government's requests, such, for example, as the request that the Subano headmen gather their people together in permanent villages, to be built, preferably, on the coast.

It is hoped that some slight service was rendered by the frequent talks on subjects of this kind, which the earnest questioning of the Subanos themselves made necessary.

The return journey to Manila was begun on July 17, the steamer reaching that port five days later.

Respectfully submitted.

EMERSON B. CHRISTIE,
Assistant Ethnologist.

To Dr. MERTON L. MILLER,
Acting Chief, Ethnological Survey, Manila.

REPORT OF THE COMMERCIAL MUSEUM.

MANILA, *September 1, 1905.*

SIR: I beg to submit the following statement of the work of the commercial museum for the year September 1, 1904, to August 31, 1905:

The museum occupies the same rooms in the Oriente building which it had a year ago, comprising a floor space of nearly 4,000 square feet and a wall space of about 1,500 square feet. The number of exhibitors has increased during the past year from 26 to 40. The

new exhibitors are almost exclusively United States and Manila firms, and the new exhibits consist chiefly of household utensils, tools, and machinery. The space at the disposal of the museum for exhibition purposes has been entirely occupied for some time. Five local manufacturers and six importers have applied for space in the museum which can not be given. A large number of American manufacturers have applied through their local representatives for space to exhibit large collections of machinery, tools, and supplies for agricultural purposes, for road building, mining, lumbering, milling, irrigating, and manufacturing.

It is sincerely regretted that the museum has not sufficient space to accept these exhibits, or at least a goodly portion of them. Machinery used in cultivating the soil and in harvesting and preparing the crops for market should be exhibited, and the museum should be provided with ample facilities for informing the planters of the islands that certain machinery, suited to their needs, may be seen at the museum. The importance of such exhibits can be understood when it is remembered that the planters, especially the small planters, never see an agricultural paper, that they receive no reports of agricultural experiment stations, that they read no newspaper that gives any attention to agriculture, and that very few of them have ever seen modern farming implements. It is this agricultural class, upon whom in the last analysis the prosperity of the country depends, who most need help in learning how to raise larger and better crops.

A considerable number of provincial farmers whose attention has been invited to the farming machinery on exhibition have called to examine it. Local dealers have freely acknowledged the good services rendered them by the exhibits in the museum. A considerable portion of my time is used in placing and caring for exhibits and giving information about them to visitors.

One of the chief lines of work pursued by the commercial museum is the investigation and study of local conditions, the demand and supply of the markets, opportunities for commercial and industrial projects, and the dissemination of the knowledge thus gained among those who are interested in the commerce of the islands and in the development of their resources. In this work the museum has aided local merchants in a large number of cases to form new business connections which have resulted in marked improvement in the quality of goods offered for sale.

A limited correspondence has been conducted with planters in the provinces, with results that are most gratifying. The planters seem anxious to find machinery that will enable them to cultivate their lands to good advantage and to harvest and prepare their crops for market by modern economic methods. A great deal of good could be accomplished along this line if the museum had the necessary clerical force.

The museum is continually receiving letters requesting information concerning opportunities for various commercial and industrial products. The subjects most frequently inquired about are farm machinery and supplies, cotton prints, the cocoanut, hemp, and sugar industries, hardware and tools. To answer these inquiries properly necessitates no small amount of research. On the request of the commercial museum, the Secretary of State, Washington, D. C., has secured and published reports from United States consuls located in tropical countries on the cocoanut industry, especially on that phase of the industry relating to the extraction of the oil and its manufacture into various articles of commerce. These reports have been appearing in the Monthly Consular Reports during the past year, and in conjunction with the bulletin on the "Cocoanut" by the Philippine bureau of agriculture, and the correspondence of the commercial museum with individuals and for the press, have attracted attention to this industry in the Philippine Islands, with the results that a factory of large capacity for extracting and refining the oil is in process of construction and that several other concerns in the United States have under consideration the building of factories in the Philippines.

In response to the wishes of a number of Manila merchants, I addressed letters to a number of manufacturers in the United States, to the National Association of Manufacturers, and to the Secretary of Commerce and Labor, Washington, D. C., suggesting that exporters of the United States be more generous in their terms of payment for goods imported by Philippine merchants. The last two letters referred to were published in American Industries, the official organ of the National Association of Manufacturers, and in the Monthly Consular Reports, thus reaching practically all United States manufacturers interested in foreign commerce. The museum has received assurances from a number of exporters of the United States that they will in the future be guided by the suggestions of the museum. If long-time payments on imports can be obtained a more healthy competition in our markets will be possible than under conditions where a few firms do the importing and carry the credits for smaller firms at ruinous rates of interest; and it will often occur that planters, who otherwise would be compelled to continue with their inefficient tools and wasteful methods, will be able to purchase modern machinery by which they can increase the quantity and improve the quality of their crops.

Three years ago there were practically no American cotton goods on the Philippine market. The commercial museum at that time made some suggestions relative to the

tastes and demands of the local market. In the calendar year 1904 the imports of cotton goods from the United States were valued at $440,918 United States currency, and for the first quarter of the calendar year 1905 at $347,648. During the past year the museum, in response to a request from American manufacturers, made a special report on the cotton goods demand of this market, and also secured special correspondence of a technical nature on this same subject for cotton manufacturers. It is believed that this work will result in competition for our cotton goods trade that will mean either better goods for the money, or the same quality of goods for less money.

Believing that Manila occupies a stragetic commercial position, and that the future will witness a marked increase of commercial intercourse between America and the Orient, the commercial museum, about a year ago, presented to the secretary of commerce, Manila, P. I., suggestions for the establishment of Government bonded warehouses and a "Free zone" in Manila Harbor. At the same time the Secretary of State, Washington, D. C., was requested to secure certain information concerning the establishment and conduct of warehouses in the great shipping ports of the world. The museum has just received Special Consular Report, volume 35, containing the reports of 122 consuls on the subject. This volume contains a fund of information on the subject treated, and will no doubt be of great value to those who are charged with the construction of our new harbor, wharves, and warehouses, and their administration after completion.

The attention of the commercial museum has been called to the following lines of work, which, however, have not been undertaken owing to the lack of necessary equipment:

A compilation for hand reference of the customs duties of the Philippine Islands and of the principal countries with which we have commercial dealings.

A comparative table of weights, measures, and moneys used in the chief commercial countries.

Periodical pamphlets noting: (a) New or projected tariffs in countries trading with the Philippines; (b) new or projected legislation in other countries that will affect the Philippines; (c) the tendency or movement of trade: (d) statistics on the great staples of commerce; (e) commercial law bearing on shipping, insurance, trade-marks, patents, etc.

It is believed that it would be well to employ a specialist in the commercial museum, or in the museum of natural history, to devote his time to the study of fishes, oysters, pearls, mother-of-pearl shells, and other shellfish of commercial value.

It is also believed that exhibits of Philippine raw products might be placed to great advantage in some of the large commercial cities of other countries, and similar exhibits in the Philippine museum of both raw and manufactured Philippine products.

Respectfully submitted.

SAMUEL B. SHILEY,
In Charge of Commercial Museum.

To Dr. MERTON L. MILLER,
Acting Chief, Ethnological Survey, Manila, P. I.

APPENDIX N.

REPORT OF THE CHIEF OF THE BUREAU OF AGRICULTURE FOR THE YEAR ENDED AUGUST 31, 1905.

MANILA, P. I., *September 5, 1905.*

SIR: The year shows a loss of 12 and a gain of 8 employees, or a net reduction in force of 4. Dr. G. E. Nesom, assistant chief, entered upon his duties October 11, 1904. Dr. H. L. Casey was appointed director of studs, and J. J. Barnes stud groom. Ajay Washburne resigned as manager of the stock farm and his place was filled by appointment of Dr. A. S. Shealy, who took up his duties on March 1. Dr. H. H. Dell, director of animal industry, resigned on March 21, and his position has not been filled. J. W. Cook, disbursing officer, resigned on February 6, and the work of disbursing was given to F. L. McVeigh, in addition to his duties as property clerk. C. E. Miles, superintendent of rice farm, resigned May 15, and Z. K. Miller, machinery expert, detailed to take his place, in addition to his other duties. Several other resignations and removals have occurred, and in most cases new appointments have not been made, the work being consolidated with that already being done by other employees.

The following is a complete record of changes among employees during the year: Gain—H. L. Casey, Septemper 1, 1904; J. J. Barnes, September 1, 1904; Eugene Moran, September 11, 1904; G. E. Nesom, October 11, 1904; R. E. Burris, November 1, 1904; B. L. Moss, December 1, 1904; A. S. Shealy, March 1, 1905. Loss, by resignation—Ajay Washburne, July 30, 1904; M. M. Klein, October 8, 1904; J. M. Marcaida, January 25, 1905; J. W. Cook, February 6, 1905; E. Moran, February 15, 1905; H. H. Dell, March 26, 1905; C. E. Miles, May 15, 1905. By transfer—F. Ruggles, to bureau of internal revenue.

In addition to the above, 4 employees were removed.

The policy of reducing the number of employees had been vigorously followed in the latter part of the preceding fiscal year, so that the bureau now has 11 salaried men less than it had on January 1, 1904, and has two more farms and experiment stations, besides increased work at all the old stations. Although the larger volume of work at the larger stations required a much greater amount of common labor than heretofore, the total expenditures of the bureau were about ₱21,000 less than the preceding fiscal year. The revenue from the sale of surplus products has been about ₱45,000, as against ₱9,000 in the year preceding.

It is planned to abolish the Batangas experiment station, because the conditions there are almost exactly the same as at Manila, where the same class of work is being done, and to abandon the stock farm at Culión, distributing the animals now at that place between the dairy farm at Manila and the Baguio stock farm. It has been planned to transfer the San Ramón farm to the Moro government, which has large schemes for growing abacá and cocoanuts for distribution to planters throughout Mindanao. These changes, it is believed, will affect a further saving of appropriations for the bureau to the extent of about ₱30,000.

An additional reason for removing the animals from Culión is that they have not done at all well there. The land is very poor and the grasses tough and fibrous. Ticks and flies are very bad, and most of the animals have developed very slowly or lost flesh, even under feeding in addition to grazing. There are some 40 young calves in the Culión herd, part of them from Jersey and part from Shorthorn bulls crossed with Chinese cows. Those having Jersey blood will be kept at the dairy farm and those having Shorthorn blood will be sent to Baguio for further improvement by crossing with beef bulls. Some very interesting experiments are planned with these calves in immunizing them against rinderpest by the bureau of government laboratories. These calves are out of immune mothers, and it is believed that on account of this fact and because they are yet young they may easily be rendered immune. After being rendered immune it is proposed to use these calves for a while in the production of vaccine.

DAIRY FARM.

The dairy established about a year ago under such favorable auspices soon met unexpected troubles In giving the cows the simultaneous inoculation with serum and the blood of rinderpest cattle, a method which before and since amply demonstrated its efficiency in immunizing Chinese cattle, resulted in a loss of 52 out of 60 head so treated. It is

true only about one-half of the herd received injections of virulent blood, but the other half contracted the disease from these a few days after they had taken the disease. Such a result was naturally a great surprise to all concerned, and especially to the bureau of government laboratories and the bureau of public health, whose records show thousands of native and Chinese cattle successfully immunized by identically the same method, with seldom more than a trifling loss. One small herd of American Jerseys had previously been immunized for this bureau without loss.

Such results, it has since been learned, have had their parallel in other countries. Rinderpest has overrun Germany, France, and Russia several times in the last century, killing millions of cattle. It has been found that there is a race of gray cattle in southern Russia which passes through the disease with a loss of 20 to 30 per cent, and which may be immunized with a loss of 10 to 15 per cent. At the same time it was found that 75 to 90 per cent of other European cattle died of the disease, and the percentage of loss from inoculation proved so high and the danger of further spreading the disease so great that it was never resorted to in order to stamp out the disease in Germany, France, and Great Britain.

The remnant of the herd, with some calves that had been saved (and these all came through with no serious trouble), was added to by the few Jerseys on hand, and afterwards 14 Australian cows were purchased, making the number about 25 in all. These Australian cattle had been in Manila over a year and had evidently been kept isolated from the disease.

Notwithstanding generous use of serum, several of them took the rinderpest. Two undoubtedly died of this disease, and two more died, but it is not certain whether from rinderpest or not. One cow and two or three yearlings recovered from attacks of rinderpest. Some cows and most of the yearlings were not attacked, probably being protected by the serums. One thing encouraging to me is that we have never lost a calf or a yearling from this worst of all cattle diseases.

Milch cows that are free from disease do well here and produce good quantities of rich milk. Feeding and caring for cows has proved to be cheap. The grasses, if kept reasonably well grazed down, are abundant and nutritious, while a constant supply of green forage that may be raised, together with cocoanut cake, one of the cheapest of concentrated feeds, and cotton seed, which is a waste product here, have rendered feeding quite inexpensive.

We now have every reason to hope that the herd is entirely immune, and if so, it will soon multiply and become quite a profitable venture. Milk is being delivered daily to two of the government hospitals, and the only dissatisfaction is that there is not enough of it. Several cows are due to become fresh in a few weeks, and should materially increase the supply of milk.

The bureau of government laboratories has planned to make some trial purchases of Australian calves of dairy breeding to be used for vaccine production, and afterwards to be turned over to this bureau to increase the dairy herd. If correct in our belief that young animals may be immunized successfully, whether of European races or not, the establishment of good herds here will not be so difficult. Young cattle grow and develop with remarkable rapidity in the Philippines, where the land is reasonably good. I am now as confident as I ever was that we will solve the problem of creating a large dairy and a large dairy interest here.

The inducement is certainly great. About $225,000 gold are sent abroad for condensed milk, and this sells at such prices that enough condensed milk to make a gallon of milk of the strength of the good fresh article from the cow costs the consumer from 60 cents to $1 gold.

BEEF CATTLE.

The bureau since last report has brought out a pure Devon and a pure Galloway bull. These have been sent to the high mountain sections of Benguet and Lepanto-Bontoc, and are doing well. Cattle are free from disease in these sections and thrive remarkably well. In addition, several young bulls of Shorthorn and Jersey breeds are being distributed among the provinces.

The importation of live cattle and dressed beef into the Philippines approximates $1,000,000 gold. Although competition has reduced prices materially, the cost is probably at least 50 per cent higher on live cattle and dressed beef than on equal qualities in normal times in the United States.

I repeat what I said a year ago, that raising cattle in a large way in these islands will become one of the prettiest business propositions in the world, if only the one question of contagious disease can be settled. During a trip I lately made through Batangas Province I was amazed at the superb appearance of all the cattle there. They are of the Chinese type, but looked 200 pounds per head heavier than Chinese cattle coming in to Manila. They are invariably as fat as any corn-belt cattle I have ever seen, and this without any food except native grasses and a little green corn forage given to those that work. The province of Batangas has 15,331 cattle and 8,858 carabaos. These figures show the great relative importance of the cattle interests in Batangas as compared with the number of carabaos

kept. The large Batangas bulls and oxen pull the same plows and draw the same loads as the carabaos; they work much faster and do not have to spend half their time wallowing in the mud and water. It is a great pity that cattle of this class have not been substituted for carabaos in all parts of the islands.

Herewith, marked Exhibit A, will be found the report of H. T. Edwards, fiber expert, written five months ago, as he was leaving the islands on vacation. This report shows the efforts that were put forth and the apparent success attained in persuading the people to clean their hemp better and put it on the market in better condition. Although manila hemp is the best cordage fiber in the world, so much of it has been poorly cleaned and handled the last few years that the average price appears to have been no better than that of sisal hemp, which, though decidedly inferior naturally, is all uniformly well cleaned by machinery.

After all, unless the buyers of hemp make distinction enough in price to justify the individual hemp grower and hemp stripper to clean it better, it is not to be expected that the quality of his product will be improved. In other words, the hemp grower will not be apt to feel like joining a trust for the bettering of the industry, as a whole, if he lose money as an individual in the transaction.

ABACÁ WASTE FOR PAPER.

The subject of abacá waste has been still further pursued. It was found that for every pound of dry fiber stripped by the common process a pound of dry waste was gotten, which is about one-half pure fiber. This material proved easy to dry, and a great many samples were sent to different paper mills. One chemist of a large paper concern produced 36 per cent of the waste in pure paper pulp, and gave it as his opinion that the waste would make a grade of paper equal to the best linen. On investigation we found that the best linen paper in the United States is worth 18 to 20 cents gold a pound. The possible gross value of paper in a pound of the waste, then, would seem to be about 7 cents United States currency. We have no means of ascertaining what the working cost of a paper mill on such material would be. At any rate, there seems good reason to look forward to this formerly wasted material as a source of considerable profit to the hemp grower.

The 10,000 sisal plants brought in from Hawaii are all doing well, according to reports received. These plants do not have spines on the edges of the leaves, which is a decided advantage in handling them.

Since Mr. Edwards left, the fiber investigations have been continued, and particularly with fiber-cleaning machinery. These matters are further discussed in commenting on the report of Mr. B. L. Moss.

KAPOK, OR TREE COTTON.

This product has received much attention. It is no doubt the world's finest stuffing material, and a recent cablegram quotes its price in New York at 12¾ cents gold per pound. It has been determined that large quantities can be had in the islands at about 5 cents Philippine currency in the seed, the seed making up about 63 per cent of the weight. We found that a McCarthy gin for ordinary cotton cleans it perfectly of the seed. The price in New York should enable those buying, cleaning, and shipping it to make a good profit. We submitted the seeds to the bureau of government laboratories for analysis and they were found to be 38 per cent richer in oil than the ordinary cotton seed. They should have a fertilizing value of about $17 gold per ton. We have been feeding them to advantage to different kinds of stock.

Wishing to learn still further about this fiber, we have made tests that prove that one pound of the cleaned kapok makes as large and as good a pillow as two pounds of feathers. Counting kapok at 12½ cents a pound and feathers at 50 cents a pound, the former is eight times as cheap a stuffing material as the latter. It seems never to lose its elasticity and never packs or mats as real cotton does. It does not become wet if immersed in water ever so long. It is claimed to be the best material for life preservers known, being much superior to cork.

It will buoy up and keep above water 35 times its own weight, and 10½ ounces of the material have been found to support a man weighing 145 pounds in the water. A French society in making some experiments with it as life-saving material is said to have found that after soaking for 18 hours a small mattress made thereof supported several men.

According to our experiments it seems that a kapok pillow equal to a 2-pound feather pillow can be made complete for less than 25 cents gold. A feather pillow will probably not sell in competition with pillows made of kapok after the latter's merits shall have become well known. The slow changes taking place in the animal matter of feather create disagreeable odors. On account of cheaper covering material the kapok can be shipped to the United States and there a pillow could be turned out for about 25 cents that would be superior to a feather pillow which would cost not less than $1.25. It would seem also

that thick comforts for covering in cold climates could be made to great advantage out of this material, inasmuch as a comfort, say, 3 inches thick and making practically a dead air space of this thickness, would not weigh as much as a double blanket. As a mattress material 10 pounds would equal 20 pounds of feathers, and, I believe, 40 pounds of felt. It would therefore seem that there is a remarkable opportunity in the United States for pushing this Philippine product, and as a result of our investigations a large amount of kapok is in preparation to be sent there for sale, the markets having been tested by cable. It is almost certain that a reliable supply and a reasonable amount of advertising would create a demand for more than the whole world now uses. In this connection a letter was sent to a dozen or more upholstery firms in the United States, as follows:

"BUREAU OF AGRICULTURE,
"*Manila, P. I., July 10, 1905.*

"GENTLEMEN: Are you acquainted with the kapok, or tree cotton, for pillows, cushions, mattresses, etc., and, if so, do you use it? I believe that a pound of cleaned kopok will make as good a pillow as two pounds of the best feathers, and would always be free from the decomposition and the more or less unhealthful odors that must arise from feathers, hair, wool, etc.

"Seeing the excellent qualities of this material for various purposes of the kind mentioned, I have been surprised that firms such as yours have not made up this material and advertised it extensively on its merits. There must be one or more million pounds of cleaned cotton going to waste in these islands each year. This bureau is now making an effort to put it in touch with the people who buy it or should buy it. We have at the present time some 60,000 pounds of it collected. We are sending you a small sample and would like to hear from you as to its market value, its qualities, etc.

"Very respectfully,

"W. C. WELBORN, *Chief of Bureau.*"

COTTON.

Experiments with cotton have, in almost every instance, proved a complete failure. Last year a good crop was raised at the Batangas station, but this year no crop at all was gotten. Every trial so far made at Manila, extending over two years, has been a failure. The small supply grown in the islands is of inferior quality and by no means certain in amount. The persistent attacks of insects are largely responsible for this failure.

Prof. W. S. Lyon's report, as horticulturist in charge of seed and plant introduction, appears as Exhibit B. Most of the vegetable crops commonly grown in the United States can be perfectly well raised here at some season of the year. The best time for plantings have been pretty definitely determined for all vegetables that may be successfully grown at all. With this definite information fewer and fewer failures are reported

One very notable increase has occurred, in number of applications for seeds from teachers and pupils of the schools all over the islands. So far as I can learn, these applicants make better use of seeds than the general average. In connection with their applications for seeds they also apply for bulletins and other publications of the bureau in largely increasing numbers. In order to meet the wants of the schools and their pupils it will become necessary largely to increase our supply of seeds for distribution, and I have estimated for an increased appropriation for this purpose. The bureau farms are growing and saving more and more of certain kinds of seed, but most of our supply for distribution will still have to come from abroad.

Special attention is called to the large list of valuable plants, new to the islands, which are being introduced from Java, British India, tropical America, and elsewhere.

JUTE.

I had been very hopeful that the jute plant, which produces the sacking material (gunny cloth) of the world, would succeed here. A trial was made last season, but the growth was too small to be profitable. I felt sure the reason of this poor growth was that the seeds were sown too late in the rainy season. The plantings this year were made at the beginning of the rainy season. The yield was only about 700 pounds per acre, and this would seem too small to prove profitable. At Batangas, where the land is better, and had been manured, the results appear to be not quite so good, even. There is another variety of jute which is growing wild in the islands that is much taller and may give better results under cultivation. It is probably well worthy of a trial. If a yield of 1,500 pounds of jute per acre could be gotten it would no doubt be a profitable crop, as it would be worth for export about 3 cents gold per pound.

Exhibit C comprises the report of H. J. Gallagher in charge of the Batangas station. This station has had marked success growing corn, sorghum, teosinte, velvet beans, giant beggar weeds, peanuts, and most forage and garden crops.

CASSAVA.

A test was made at this station of cassava (*Manihat utilissima*), which was discussed in the last annual report. The roots of this plant make excellent starch and are the sole source of the tapioca of commerce. The yield at Batangas on a small plot indicated 14 tons per acre. This is probably higher than could be expected on a larger area. Ten tons per acre would be a safer estimate. The samples we have had analyzed generally show about 28 per cent of starch, which means that a starch factory may be expected to recover 24 or 25 per cent of the weight of the roots in starch or tapioca. Considering the high price of starch and tapioca in the Philippine markets this should be an inviting field for investment. One gentleman in Mindanao is now planting it on a large scale and is negotiating for starch-making machinery.

Mr. Gallagher has lately been caring for the little coffee plantation of the bureau at Lipa. I visited this place lately. The young trees are loaded with fruit, and while they are suffering to a certain extent from fungous disease they are much more nearly free from it than other trees not so well worked and cared for. It is yet a question as to whether the once prosperous coffee business of Batangas can be built up again. The effort should not be abandoned until more of the varieties found to be resistant to disease in other countries shall have been tried. Good coffee is now being grown in the high mountain regions of Benguet and Lepanto-Bontoc, but as yet transportation facilities to and from these places are not sufficient to make it a profitable business. Considering that the islands import about $34,000 worth of coffee a year, and that this coffee largely comes through the United States, there is a fine opportunity here for coffee growers. So with cacao. The islands import about $135,000 worth annually, and there is good reason to believe that much of the land in our southern islands is as fine cacao land as can be found in the world. Cacao seems to require for its best success about the same climatic conditions as Manila hemp; that is, continuously moist and fairly cool.

Z. K. Miller, machinery expert, in charge of the rice farm at Murcia, makes his report, marked Exhibit D. A good crop of rice of excellent quality was made during the year, and it attracted a great deal of favorable attention, from the people of Luzón particularly, who visited the place in large numbers. Hundreds of people have gone there to see the steam plow, the thrashers, reapers, and other machinery in operation. These exhibitions have resulted in sending to America large orders for machinery, much of which has already arrived and been put into use by the people. Only one month ago two sugar planters from Negros Oriental came to Manila and from there went to Murcia to see the steam plow and determine whether to buy similar machines. They both placed orders with the agent representing the firm making the machinery.

The land on the rice farm, as pointed out in previous reports, is poor and is not level enough for best work, making it excessively costly to operate in proportion to returns. A much larger crop is now growing than that of last year. All the land was plowed during the dry season with the steam plow. Surra had killed nearly all the horses and mules at the station, and without the plowing machinery it would have been impossible to plow the 600 acres which have been planted.

COST OF PLOWING.

As will be found itemized in Mr. Miller's report, it would seem to cost about $1.80 gold to break an acre of land by steam. Part of the time harrows were also drawn behind the plows, thus performing this additional operation at about the same cost. The plows work well in cogon grass land. Where the land is taken with this large grass, as most of it has been, it is tremendously expensive and difficult to bring it into cultivation with the teams and plows and means that the people generally have. The roots of the grass are large, tough, and cane like, and native plows can not tear them out except with great difficulty. To subdue cogon grass the farmer generally cuts it down with bolos, piles it up and burns is, plows the land at intervals five or six times, and does no end of digging with picks and cane hoes to finally get it into a clean state for planting.

After burning over the plot the steam plow will break the worst cogon land perfectly, but with some extra expenditure for fuel.

Steam plows are less suited for work on rice land than other land, because of the necessity for tearing down and building up again so many of the small dikes. Their very best and most profitable uses will be found in bringing into cultivation again land that has gone into cogon grass, whether it be for rice or not, and in preparing any land for sugar cane, corn, or any other crop than rice.

A few steam plows centrally located and properly operated could be made to aid greatly in bringing a larger area of land under cultivation. If arrangements could be made whereby the people would furnish wood for fuel and water for the boilers, along with some common

labor to assist in the operation, a charge of only 60 or 80 cents gold an acre would compensate the government for the use of the machine and the hire of a good engineer. I would recommend that two or three outfits be purchased to be operated on such a basis for the benefit of the farmers of the islands.

The rice planted in seed beds and transplanted in the field six weeks later on freshly cleaned land made a better yield than that sown on the land where it grew. This difference in yield was more than sufficient to pay for the cost of transplanting. The smaller yield from the seeded rice arises from the fact that the grasses and weeds get an equal start with the young rice. Particularly the coarse grasses coming up from jointed roots grow so rapidly that the rice must be weeded to make headway against them. When rice 12 inches high is set in newly cleaned land it tends to keep the mastery over the weeds and grasses, and then water can be put over the land deep enough to help keep them down. There is little probability that American methods of sowing rice here will ever prevail. A better method of plowing the land would unquestionably be of advantage, and also in harvesting, thrashing, and cleaning, but the planter should no doubt drag his land while muddy just before planting, so as to clean it of all weeds and grass and transplant the main portion of his crop. The length of the planting season can be about doubled by sowing on the land where the rice is to grow and transplanting combined. But the seeded rice must be well weeded if a good yield is to be expected.

Another practice of undoubted benefit is to grow velvet beans, peanuts, mangoes, or other leguminous crops during the dry season, to enrich the land for the main rice crop and at the same time to yield a profitable return in itself. The average yield of rough rice in the archipelago was 727 pounds per acre in 1902, as shown by the census report. This yield could no doubt be immensely increased by growing restorative crops on the rice land during the dry season. The velvet bean in particular is a great drought resister and will make a dense shade on the land, effectually choking out and killing every spear of obnoxious grass thereon.

Samples of the various grades of milled rice from Philippine paddy have been forwarded to New York for comparison with American and foreign rice reaching that market and for quotations of market values.

The report of John Heil, farm superintendent of the La Carlota experiment station, is appended, marked Exhibit E.

This station, comprising about 1,250 acres of land, is being slowly brought into cultivation and is mostly planted in sugar cane. A small Spanish mill, very old and badly worn, is on the place and is being used to manufacture sugar of such cane as is grown. The yields so far made have not been encouraging. Of course, there are considerable losses in the manufacture, but the field results themselves have not come up to expectations, this place being near the mountains and far more fertile than the great majority of the plantations. Irrigation has been practiced to a slight extent, but so far there is not sufficient water development to serve for more than a few acres.

Considerable quantities of cane of several varieties imported from Honolulu are being grown, but no milling test has yet been made of these along with the kinds commonly grown.

So far no commercial fertilizers have ever been used on sugar cane in the islands. With the small yield the people get, of about 1½ tons of sugar per acre, it is difficult to see how planters can make a profit at any price likely to be received for sugar. If, by fertilizing and irrigating, yields could be brought up to 3 tons of sugar per acre, good profits ought to result. We expect to experiment on a rather large scale with fertilizers for sugar cane during the coming season.

The Kentucky mares sent to this place unfortunately became contaminated with glanders, and eight of them have been lost. Aside from this trouble they have done well, and the surviving animals are doing good work on the farm.

The last dry season proved too severe for the abacá, or Manila hemp, planted on this place, but the 5,000 Hawaiian or Bahama sisal plants are doing remarkably well.

All the forage plants succeeding so well at the other stations did well at La Carlota.

Exhibit F contains the report of Dr. H. L. Casey, director of studs, in charge of the stock farm at Baguio.

It was thought that sooner or later disease would kill the mares kept in the lower parts of the islands, and that the best chance to preserve a small herd of breeding stock was to put it up in the mountain region. The horses sent there have so far kept perfectly healthy, and it is not believed that surra has ever existed or ever will exist at that elevation. In addition to the Kentucky mares and the stallions, there are also kept a number of native mares and burros and a small herd of cattle. It is planned to select a permanent location for this stock farm on a site adjoining some good land in the Trinidad Valley.

In this connection it may be mentioned that the twelve stallions and four jacks stationed at different points in the islands have, from records and reports received, served approximately 75 American and Australian mares and over 200 native mares. There is a

widespread belief among the Filipinos that giving birth to foals by an American sire will kill their small mares. I have seen a colt by one of our larger stallions out of a native mare of only average size. It was delivered without difficulty and is quite promising.

Exhibit G contains the report of Will Jessup, superintendent of the Trinidad experiment station. This station is at an elevation of about 4,500 feet, and nearly all temperate zone vegetables grow well there. It is the one place in the islands where I have seen Irish potatoes, English pease, and onions do as well as in the United States. Of course, this station is as yet without adequate transportation facilities and many pioneer difficulties have to be met. Labor and supplies are costly. The irrigation problem on the station would seem from Mr. Jessup's report to be about settled. It will probably be impossible to get an adequate supply of fertilizers up there until railroad facilities will enable us to ship commercial materials. Fruit trees have so far not proved successful, but a large quantity of strawberries have lately been set out, and it is believed that they will succeed.

It is almost too cold at the station to grow teosinte, sorghum, or velvet beans to advantage. The forage, therefore, will have to be made from oats, rye, barley, wheat, etc.

Timothy and clovers show some promise of success from certain small plantings made, and are to be further tried.

SAN RAMÓN FARM.

Mr. George M. Havice's report, Exhibit H, shows that this large estate has just passed through an eight months' drought. A drought in 1902 and 1903 nearly destroyed the hemp and cocoanut trees and the drought of the present year seems still worse. The few weather records available show this particular part of Mindanao to be among the driest portions of the archipelago, and it would seem too dry and uncertain to make hemp growing successful without irrigation. The engineering difficulties in the way of irrigation are serious, and the installation of such a system will be very expensive.

My opinion is that if our abacá had been handled according to the custom among the Filipinos, which consists in cutting down the larger weeds and grass once a year, and nothing else, we would have had very little left. But our abacá has been regularly cultivated with plows and cultivators, thus enabling it generally to survive, and with the return of moist conditions it is growing with great vigor.

Lately, the work of clearing, plowing, and planting has gone on more rapidly than ever before. There seems to be no serious obstacle in the way of planting 200 additional acres this fiscal year, as about 103 acres have been cleared, plowed, and partly planted during the last six months.

Experiments in fertilizing cocoanut and hemp land should be made at San Ramón. There is every reason to believe that both crops would respond bountifully, especially as they have occupied the land for many years and given generous crops each year without the return of anything to the land.

San Ramón should have machinery for cleaning cocoanut husks and making the coir fiber of commerce, so largely used in making rope, brushes, mats, etc. It should also be equipped with drying machinery for copra instead of the crude and unsightly method now used of smoking the meat of the cocoanut until it becomes dry.

It is planned to turn this farm over to the government of the Moro Province, and it is understood they intend to put in these improvements and otherwise greatly enlarge and extend plantings of cocoanuts, hemp, and perhaps cacao.

Mr. A. M. Sánchez, soil physicist, in charge of tobacco experiments at Arayat, makes his report, Exhibit I.

I am now convinced that these experiments were undertaken too late. The land was never gotten into good tilth until the extremely dry weather came on. The young crop did not grow as well as it should have done; and in order to save it at all pumping machinery had to be carried there to irrigate it. The crop suffered much from drought and from insect attacks and disease. I am now sure plantings at Arayat should be made six weeks or two months earlier than in the Cagayán Valley, in order to have approximately the same kind of season.

Some beautiful specimens of shade-grown Sumatra wrapper tobacco were gotten. Some of these were used to wrap cigars by one of the factories here and were criticised as being coarse veined as compared with Sumatra grown leaf, and weak in texture, owing, it was thought, to improper curing. That grown without shade was not good enough to be used for anything but filler.

The difficulties in the way of this experiment were greater than I had anticipated, and the facilities not at all what they should have been for the best success.

The report of Mr. B. L. Moss, superintendent of Singalong experiment station, appears as Exhibit K.

Variety tests of sugar cane, with an incidental test of preparing land 18 inches deep as compared with 5-inch plowing, are under way. The yields will be carefully compared and chemical analyses made, with the view of finding out if there are other varieties of cane

more profitable to grow than any of the few kinds now grown here. It is entirely likely that one or more varieties may be found of superior qualities, but it is not probable that every cane which might be introduced would necessarily prove superior or even equal to the common kinds grown in the islands. There is a widespread belief that, because a certain cane is grown for many years in the same locality, it "runs out" and becomes inferior. It is also firmly believed that because a certain cane has been made to yield 60 tons per acre in Hawaii for a great number of years, it will do the same if brought here and placed under conditions where our cane yields 20 tons. There are probably no facts which would justify either of these views.

Another experiment with planting at different seasons from those commonly observed seeks to determine if we may not so arrange our plantings and so irrigate them as to provide ripe cane for a period of six or even nine months.

With a milling season of one hundred days a modern up-to-date milling plant would cost, in original investment, $100 to $150 gold for each acre of cane to be manufactured. If the milling season can be extended to two hundred days, then $50 to $75 invested in a mill for each acre to be worked would be about the expectation.

No milling operations began in the islands last year until about December 15, and by April 1, 1905, all the cane was so dried up that it was hardly worth milling. Of course irrigation alone might have kept it along for some time.

CORN GROWING.

American corn has invariably done well, and the standard field varieties make roasting ears in two months from planting and corn ready for gathering in two and one-half months. It is certain that for six and perhaps eight months of each year corn could not be stored and handled in a large way, as in the United States, without kiln drying. The atmosphere here is too heavily charged with moisture to dry it by natural process. Then, insect attacks are much worse than in any part of the United States. In order to store corn and keep it for any considerable time frequent applications of carbon bisulphide would have to be resorted to in order to kill weevils and other grain-eating insects.

Corn in the islands is generally allowed to get too hard to suit Americans for roasting ears. It is half parched and partly burned over coals of fire, and is eaten from the cob.

I found one mill in Batangas grinding corn into a coarse grit and mixing it with rice. Two small corn mills have been received by the bureau for making corn meal. These will be loaned to the bureau of education to be operated in certain corn-growing districts in connection with industrial school work.

Of the three breadstuffs available, wheat flour, rice, and corn, flour costs perhaps 3½ cents gold per pound, rice 2½ cents, and corn about 1 cent. These three food stuffs possess very nearly equal food values per pound, and by the time the flour is made into bread the cost of the material will be still further raised. For people who are as poor as the Filipinos, and who always live so close to the famine line, this matter of the cost of the main food stuffs is of great importance. With some irrigation corn could be had in succession nearly all the time. In a small way it could certainly be dried and stored for a month or more for bread or for "arroz de maiz," as they call the grits made from corn. These corn foods require nothing to be added to them to prepare them for the table, but like rice, needed only water and heat.

The southern cowpea, so much prized as the clover of the South, a great land-enriching, forage, and human food-producing plant, has been growing quite successfully lately. Planted in the dry season, the plant lice almost ruined it, but the wet-season plantings have all made tremendous growth of vines, which are now fruiting heavily. It covers the ground with a dense shade and kills the foul grasses, as well as does the velvet bean. The people grow a tropical variety of this pea (properly a bean) all over the islands, but it seems not to fruit abundantly. Large crops of this pea may be grown, dried, stored, and eaten as needed. It is rich in protein or muscle-building material, and would serve the same necessities in the nutrition of the people as fish does.

The peanut, another restorative crop, making excellent human or animal food, grows like a weed here. One kind introduced by the bureau from the South is remarkably easy to harvest, as all the nuts are pulled up with the tops. We have lately gotten a yield of about 70 bushels per acre therefrom, and the vines make good forage. Peanuts are grown to some extent all over the islands, but nobody appears to grow an adequate supply. They are easily dried, and may be kept for any length of time. The peanut is about half oil, and is also very rich in protein, making it, like the peas, a desirable diet for a rice-eating people.

It is one of the great oil-producing crops of the world. A ton of peanuts yields about 100 gallons of oil, most of which may be used as a substitute for olive oil. The cake, after the oil has been extracted, is one of the richest feedstuffs known.

The growing of peanuts, cowpeas, or velvet beans, Mr. Moss's report shows, may transfer from the air to the soil 100 to 200 pounds of nitrogen, having a fertilizing value in the islands of perhaps 20 cents gold a pound.

The sorghums and teosinte as forage crops have continued to make large yields, but the sorghums are decidedly superior under most conditions. The kaffir corn makes a grain approaching rice in composition. It is, we understand, used as the principal food of millions of people. We find a large and inferior sorghum growing everywhere in Batangas and its seed used as human food. The kaffir corn which we have introduced is greatly superior to that and is evidently a larger yielder. It will be distributed over Batangas particularly, to take the place of the plant of this kind grown there and known as "Catad."

It is indeed strange that plants like the sorghum and kaffir corn, growing so luxuriantly at all seasons and under all conditions, have been so slow in finding their way here.

SISAL HEMP.

The plant known as maguey is growing more or less in every part of the islands. We have determined positively that it is the *Agave rigida* of the botanist, or the true Yucatan fiber plant, from which most of the world's binder twine is made. The people in western Luzón, where most of this fiber is grown, rot the broad sword-like leaves in water until the pulp will shake out from the fiber and then dry and brush the fiber and send it to market. In the world's markets it is known as manila aloe fiber. This is perhaps due to the fact that the poor method of preparing it for market makes it resemble the inferior aloe fiber of commerce.

About a year ago a large and expensive machine from Mexico was brought into the islands to clean the maguey. We learn it has never given satisfaction. About five months ago the bureau received a small machine that was so poorly made that it would not work. After a large amount of adjusting, we got splendid results as to quality of fiber, but it never approached the capacity claimed for it. Some excellent samples of machine-cleaned fiber have been sent to London and New York for quotations as to market value.

There can be no question as to the entire success and great economy of cleaning the sisal by machine. This plant is easily grown on any sandy, rocky, or otherwise well-drained soil and stands any amount of drought, heat, and neglect. It will probably give a yield fully equal to manila hemp per acre of land and requires a little longer time to come to maturity, say one year. Well-cleaned sisal, by reason of the fact that it is generally uniform in quality, averages about as good a price as manila hemp, since the latter is so variable in quality and the poorer qualities appear in such large proportion. So the people of the islands, having a long dry season, where manila hemp can not be grown, would seem to have equally as good an opportunity in sisal culture. Land made up of half rotten coral rock is particularly well suited to this plant, because of its easy drainage, general richness, and large content of lime. There is much of this coral land in the Archipelago which would offer fine inducements for sisal culture.

The writer has contended for a year that the machine that will eventually clean manila hemp will work on the same general principles as the sisal machines and not follow the idea of drawing the fiber strip under a knife, as is done in cleaning the hemp by hand. This crude machine afforded the first opportunity for testing the matter. We found that the manila hemp is easier to clean than sisal. We found that after the machine was once adjusted for cleaning sisal leaves successfully it never failed for one minute from that time in cleaning manila hemp. Instead of splitting the petiole to be cleaned in to thin strips we have always cleaned the entire thickness of the petiole and have often cleaned two leaves at once, lying one on top of the other.

We have averaged by machine cleaning over 100 per cent more dry fiber out of a given weight of hemp stalk than by the old hand-stripping process. We have frequently taken the part of the stalk rejected in preparing strips to be cleaned by hand and run these through the machine, getting from 50 to 100 per cent as much fiber as the hand-stripping process had gotten out of the same stalk. We submitted samples of hemp prepared in the old way, hemp stripped by machine from the whole stalk, and hemp recovered by the machine from the parts of the stalk thrown away by the hand stripper to three of the largest exporting houses of Manila for market values. Their average values showed no material difference, and all values placed on these samples are high in comparison with the regular market grades.

ROPE TEST.

Not being entirely satisfied that the buyers may not have overlooked the matter of weak fiber, since it is generally claimed that the parts of the stalk thrown away contain only weak fiber, I had some rope made from two samples of hand-cleaned fiber, three samples of machine-cleaned fiber from the whole stalk, and two samples of fiber from the hand-

cleaners' rejections of stalk cleaned by the machine. These rope samples were submitted to the timber-testing laboratory, bureau of forestry, for report. It follows herewith:

"SEPTEMBER 11, 1905.

Chief, Bureau of Forestry.

"SIR: In response to your request of September 6, 1905, I have the honor to submit the following report on tests made on eight rope specimens supplied by W. C. Welborn, chief of the bureau of agriculture, Manila, P. I.

The tests were made during the period from September 8 to September 11, 1905.

"PURPOSE OF TESTS.

"The purpose of these tests is to determine the relative strength of hemp prepared by different processes. The specimens submitted included both hand-cleaned and machine-cleaned hemp.

"METHODS OF TESTING.

"The kinds of tests included determination of weight per foot, elongation before rupture, and strength in tension.

"DETERMINATION OF WEIGHT.

"Each specimen was weighed and measured. The weight was then reduced to weight per foot.

"DETERMINATION OF ELONGATION BEFORE RUPTURE.

"A distance of 10 inches was marked off on each piece of rope tested in tension, and the elongation which occurred in 10 inches was noted.

"TENSION TESTS.

"Pieces of rope were cut about 6 feet in length. Each end was tied around a short iron bar 1¼ inches in diameter These iron bars were held in a 200,000-pound Tinius Olden testing machine, and the load was applied until rupture occurred.

"The machine was operated at a speed of 1.25 inches per minute. In fastening the rope about the iron bars several common slipknots were tried, but these knots slipped badly and injured the fibers where the knots were tied, causing the rope to break at the injured part. These knots were therefore discarded and the hangman's noose was tried, which proved very satisfactory and was used for all tests."

Results in detail.

SPECIMEN NO. 1.

[Approximate diameter, 0.36 inch; total weight, 27.375 ounces average; total length, 45.5 feet; weight per foot, 0.6 ounce average.]

Test No.	Breaking load.	Elongation.	Elongation.
	Pounds.	*Inches in 10".*	*Per cent.*
1	642		
2	664	2.69	26.9
3	586	2.62	26.2
4	610	2.56	25.6
5	654	2.62	26.2
Average	631	2.62	26.2

SPECIMEN NO. 2.

[Approximate diameter, 0.42 inch; total weight, 52.5 ounces average; total length, 71.5 feet; weight per foot, 0.73 ounce average.]

1	703	2.75	27.5
2	782	2.19	21.9
3	876	2.87	28.7
4	741	2.75	27.5
5	845	3	30
Average	789	2.71	27.1

Results in detail—Continued.

SPECIMEN NO. 3.

[Approximate diameter, 0.37 inch; total weight, 17 ounces average; total length, 38 feet; weight per foot, 0.45 ounce average.]

Test No.	Breaking load.	Elongation.	Elongation.
	Pounds.	*Inches in 10″.*	*Per cent.*
1	505	2.56	25.6
2	492	2.44	24.4
3	460	2.31	23.1
4	441	2.37	23.7
5	505	2.56	25.6
Average	481	2.45	24.5

SPECIMEN NO. 4.

[Approximate diameter, 0.38 inch; total weight, 29.5 ounces average; total length, 49.5 feet; weight per foot, 0.6 ounce average.]

1	632	2.75	27.5
2	687	2.87	28.7
3	631	2.69	26.9
4	701	2.69	26.9
5	635	2.81	28.1
Average	657	2.76	27.6

SPECIMEN NO. 5.

[Approximate diameter, 0.38 inch; total weight, 63.5 ounces average; total length, 103.6 feet; weight per foot, 0.61 ounce average.]

1	476	2.69	26.9
2	476	2.56	25.6
3	476	2.50	25
4	474	2.44	24.4
5	475	2.69	26.9
Average	475	2.58	25.8

SPECIMEN NO. 6.

[Approximate diameter, 0.36 inch; total weight, 20 ounces average; total length, 40.8 feet; weight per foot, 0.49 ounce average.]

1	415	2.44	24.4
2	441	2.50	25
3	405	2.44	24.4
4	426	2.62	26.2
5	342	2.19	21.9
Average	406	2.44	24.4

SPECIMEN NO. 7.

[Approximate diameter, 0.36 inch; total weight, 37.25 ounces average; total length, 68.5 feet; weight per foot, 0.54 ounce average.]

1	601	2.44	24.4
2	581	2.50	25
3	605	2.69	26.9
4	603	2.31	23.1
5	436	2.37	23.7
Average	565	2.46	24.6

Results in detail—Continued.

SPECIMEN NO. 8.

[Approximate diameter, 0.43 inch; total weight, 40.25 ounces average; total length, 54.4 feet; weight per foot, 0.74 ounce average.]

Test No.	Breaking load.	Elongation.	Elongation.
	Pounds.	*Inches in 10″.*	*Per cent.*
1	965	2.75	27.5
2	951	3.06	30.6
3	950	2.81	28.1
4	900	3.25	32.5
5	952	3.31	33.1
Average	944	3.04	30.4

Summary of results and final reductions.

Specimen.	Diameter.	Weight per foot.	Elongation.	Strength.
	Inches.	*Oz. av.*	*Per cent.*	*Pounds.*
1	0.36	0.60	26.2	631
2	.42	.73	27.1	789
3	.37	.45	24.5	481
4	.38	.60	27.6	657
5	.38	.61	25.8	475
6	.36	.49	24.4	406
7	.36	.54	24.6	565
8	.43	.74	30.4	944

In order to reduce the strength values to a base for comparison, it is necessary to take into consideration the difference in size and weight. Therefore, for the sake of comparison, 0.6 ounce per foot will be taken as a base and the strength of each specimen will be reduced to the strength which it would have if made in the size 0.6 ounce per foot.

The results obtained are as follows:

Specimen.	Strength.[a]	Relative strength value.
	Pounds.	
1	631	82
2	649	85
3	641	84
4	657	86
5	468	61
6	497	65
7	630	82
8	765	100

[a] Corresponding to size of 0.6 ounce per foot.

It will be necessary to leave the deduction of the final conclusions to those who have data regarding the origin of the specimens submitted, as the undersigned has no information regarding the specimens except their numbers.

Respectfully submitted.

ROLLAND GARDNER,
Assistant Engineer, Bureau of Forestry.

The following is an explanation of the specimen numbers used in the foregoing report: Specimen 1, hand cleaned; specimen 2, machine cleaned; specimen 3, machine-cleaned waste; specimen 4, hand cleaned; specimen 5, machine cleaned; specimen 6, machine-cleaned waste; specimen 7, machine cleaned with brass shoe; specimen 8, maguey or sisal, machine cleaned.

It will be seen that two of the samples of machine-cleaned fiber from the whole stalk proved as strong as the hand-cleaned fiber. One was about 25 per cent weaker. One of the machine-cleaned samples from the waste was about as strong as the hand cleaned and one was about 22 per cent weaker. Some other tests are now under way, but may not be finished in time for this report.

It may be announced for certain that we have so modified this old machine and adapted it to clean abaca with ease and certainty that it will clean the whole stalk, including the core, without any more dividing than is necessary to make the pieces fit the capacity of the machine. The output of the machine will average a little over 100 per cent more dry fiber from a given weight of stalk worked than the old hand-cleaning process. The fiber seems to bring about as high a price, and from the single set of rope tests would appear to be about as strong as the fiber cleaned in the old way.

So far as speed of operation goes, it would appear from the few short trials made that the machine driven by one or two horsepower cleaned about three times as much stalk and turned out about six times as much clean dry fiber in a given time as a man following the old process.

That these discoveries are by far the most important in a century of abaca culture I verily believe, and I have not the slightest doubt that a machine can be so modified as to multiply the capacity of this machine by ten or even twenty.

A new design of machine to do this need not have a weight for the heaviest piece of over 500 pounds, and indeed this heavy part may be made in four different pieces, if necessary. I do not think more than 2 to 4 horsepower will be needed to work it.

With the positive discovery that an extra 100 per cent of good strong fiber can be secured and the discovery of an easy and cheap means of doing this, the problem of saving and utilizing the waste becomes a much less important matter. From what we now know I should say the abacá grower has been going on for perhaps 100 years recovering 1 pound of fiber and losing 1½ pounds of all he grew. By our recent discoveries we now know that 2 pounds out of each 2½ pounds grown can be recovered, leaving one-half pound to go to waste, or 20 per cent of the whole, as against 60 per cent of the whole formerly wasted.

This 20 per cent is still worth saving, no doubt, and it can easily be done in a form suitable for paper stock. By pressing, drying, and then putting through a mechanical beating and rubbing process I have no doubt it can be recovered as almost pure fiber suitable for paper mills, or very likely by some further mechanical or chemical treatment it may be prepared or spinning into sacking material or other coarse fabrics.

HAND MACHINES.

Most people, knowing the rugged nature of the hemp country, have been contending that a very light machine, to be carried on men's shoulders and run by hand, is a requisite for success. I do not myself believe that a machine to be run by hand is a reasonable expectation. It requires all the strength of a strong man to pull 25 pounds a day of dried hemp under a knife. I do not think any combination of wheels and cranks can gain both speed and power, and any machine to be run by hand will have to multiply the number of men used faster than the capacity of the machine will multiply over the hand-stripping process. If it should prove necessary to have heavy machines operated by large power plants, the situation would still be most encouraging. There is more value in a ton of hemp stalks than in a ton of sugar cane, and cane is always moved to the mill and sometimes a distance of 75 miles. A ton of hemp stalks can be cut and handled at half the cost of cutting and handling a ton of sugar cane. Hemp stalks will float, and hence may be rafted and flumed with the greatest ease. There is no special necessity for an excessively light machine if the lightness is to make it less efficient or of smaller capacity.

The bureau has kept on hand for a year now hemp stalks for use of any one attempting to invent a hemp machine. We have sent stalks on two different occasions to the United States to try new machines. We have witnessed the trials of quite a number of new machines.

Mr. Moss's report gives all the details of the tests of our own machine.

PURE BRED HOGS.

The calls on the bureau for American hogs and their crosses with the native hogs have been far beyond our capacity to supply. Six pure Berkshire sows and several grade sows are being kept and are bringing some fine litters of pigs. These American hogs have always kept quite healthy and thrifty here. Hardly any country is so well situated to grow hogs cheaply as this is, and yet good hogs on foot appear to sell for 10 cents, gold, a pound, and nearly a half million dollars' worth of hog products enter the islands yearly and reach the consumers at prices which appear to be about twice what American consumers pay for similar products at home. I would again refer to the fact that those going into hog raising on a large scale should have some cold storage provided so as to cure their products; otherwise the Chinese butchers and buyers would make no end of trouble in trying to buy the hogs, one at a time, and to beat down prices.

It seems that an acre of peanuts may produce 1,200 pounds of growth in hogs while grazing them off. Considering that two or three crops may be grown on the same land

each year, it will be seen that quite a large profit might be realized. Chufas, artichokes, sorghum, and Kaffir corn are quite good for hogs, especially if fed in connection with peanuts or other food rich in proteins. As commercial foods the rice polish and cocoanut cake sell for far less than their prices in the United States. If gotten fresh these are both satisfactory feeds, but they deteriorate rapidly with age in this hot, moist climate.

BROOM CORN AND BROOM MANUFACTURE.

Some broom corn seed has been ordered from the United States so as to arrive in time to plant and harvest a crop during the coming dry season.

It seems from the customs receipts that manufactured brooms to the value of some ten or twelve thousand dollars find their way into the islands each year, and reach the consumers at prices over 100 per cent higher than users in America have to pay. That broom corn can be grown with great ease there is no doubt. Small bamboo or the worthless tops of large bamboo will make a handle cheaper and stronger in proportion to weight than anything else to be found in the world perhaps. No machinery of any consequence is required in broom making, and it is a class of handicraft peculiarly suited to Filipino workmen.

COMMERCIAL FERTILIZERS.

The State of Georgia uses yearly over one-half million tons of commercial fertilizers that cost fully $10,000,000 gold. The Philippine Islands use about $30,000 worth of commercial fertilizers and fertilizer materials a year. Such fertilizers as have been brought here and sold have been disposed of at such high prices as to be almost prohibitive. The people have had no intelligent idea of the uses of fertilizers, what they ought to pay for them, or what they might expect in the way of returns. It is probably a great mistake to suppose that all the lands of the islands are rich. The crops they grow indicate the contrary. Tropical soils under cultivation become impoverished much sooner than temperate soils. I have no doubt that there is an opportunity here for immense sales of commercial fertilizers at profitable prices. Much study has been given to the raw materials available here for making fertilizer mixtures.

There are quite large quantities of tobacco waste that is rich in nitrogen and potash. This material is not allowed to go to waste in any other part of the world. No use has ever been made of the large quantities of bones that may be gathered up all over the country. The dead animals now cremated might be rendered into tens of thousands of dollars' worth of rich fertilizers each year. Cocoanut cake sells for far less than its fertilizing value. Bat guanos are to be found in many localities. There are also tannery wastes that make good fertilizers.

Nothing needs to be imported to make standard fertilizers, except acid phosphates. There is no sulphuric acid made here and the prices on shipping it in are prohibitive. This is a necessary ingredient for manufacturing acid phosphate out of bones or phosphate rock. With a sulphuric acid factory, which might cost anywhere from thirty thousand dollars to a half million dollars, all the sulphur and other materials for acid might be imported, and yet its production would be cheap. With the acid, superphosphates could be made cheaply out of bone found here or out of phosphate rock imported here. There is certainly a fine opportunity for a large investment along this line.

PUBLICATIONS.

Among the publications issued from the bureau during the year may be mentioned:

The Tanarind, by W. S. Lyon.
Algunas Sugestiones sobre el Cultivo del Algodonero, by W. C. Welborn, second edition.
Cacao Culture in the Philippines, by W. S. Lyon, third edition.
List of Philippine Agricultural Products and Fiber Plants, by F. Lamson-Scribner, second edition.
Ensayos sobre las Enfermedades Fungosas de las Langostas, by L. O. Howard, second edition, in Spanish.
The Cocoanut, by W. S. Lyon, second edition.
Soil Fertility, by W. C. Welborn, in English and Spanish.
Values of Milk, by W. C. Welborn, Press Bulletin.
La Industria del Jute, by W. S. Lyon.

In concluding, I desire again to record the hearty cooperation extended by the military authorities in the islands, and by the various bureaus under the insular government.

I take great pleasure in renewing my acknowledgment of the capable, painstaking, and energetic services rendered by the officials and employees of the bureau.

Respectfully,

W. C. WELBORN, *Chief of Bureau.*

The SECRETARY OF THE INTERIOR.

EXHIBIT A.

MANILA, P. I., *April 1, 1905.*

SIR: I have the honor to present herewith the following report of the work of the division of fiber investigations of this bureau for the seven months ending March 31, 1905.

ABACÁ, IMPROVEMENT IN QUALITY OF FIBER.

The gradual deterioration in the quality of abacá, and the resulting dissatisfaction of American manufacturers with this fiber, has been one of our most serious industrial problems during the past two years. The commercial prosperity of the Philippine Islands is so dependent upon the condition of the abacá industry that any situation which threatens the welfare of this industry is of vital importance. Owing to the wide separation of the abacá producer in the Philippines from the cordage manufacturer in the United States our Philippine planters have been slow to realize how by flooding the markets with an inferior product, they were surely undermining their own future interests. The root of this difficulty lies with the planter who turns out low-grade fiber. Our main effort has been, therefore, to reach these planters; to see, first, that they had a clear understanding of the question, and afterwards that it was kept before their attention until some definite action should be taken.

This work has been carried out along several different lines. Many planters have been reached by means of correspondence, circular letters, bulletins, and personal inspection of plantations. With the coöperation of the bureau of education, our bulletin on "Abacá," has been introduced in the schools throughout the abacá-producing provinces. The governors of several provinces have done thorough and excellent work. In Albay, which produces one-fourth of the total output of abacá in the islands, the provincial governor, by means of a series of addresses before all of the municipal councils and by a series of circular letters to all of the municipal presidentes, has kept this question thoroughly alive throughout the province. In at least one province an "abacá planters' association" has been formed with a view of regulating and improving the quality of fiber exported from that province.

While this work has by no means fully accomplished the desired result, that it has not been without some effect is shown by reports which we have received from the United States during the past three months. New York manufacturers state that there has been some improvement in the quality of abacá, but that the quality is still far from satisfactory. A prominent Philadelphia cordage manufacturer writes as follows:

"In reference to the complaints of quality of manila hemp, we have had more or less trouble up to within a short time ago, when the quality appeared to be improved, so we have no complaint to make on the fiber that we are at present receiving."

These reports would seem to indicate that the retrograde movement of the past five years has been stopped, and that there is now a tendency toward the production of a better quality of abacá. If this is so, it is due to the fact that the abacá planters are gradually coming to a more intelligent understanding of what the continued production of inferior fiber will mean to the industry.

FIBER-EXTRACTING MACHINE FOR ABACÁ.

With the continued growth of the abacá industry, the demand for a fiber-extracting machine becomes even more urgent than in past years. As long as the constantly increasing demand for abacá is met with the present restricted production, the resulting market conditions will be abnormal and unsatisfactory. This fact is clearly illustrated by the following remarks of one of the leading manufacturers of binder twine in the United States, to whom we had sent samples of abacá:

"The Quilot manila is somewhat better than the average of fiber we receive, but none too good for our use. We should be glad to have all our manila fiber like the sample you sent. However, present prices of this fiber are too high to enable us to use it, the current quotation in New York to-day being about 13¾ cents for forward shipment."

This statement but shows that machine-cleaned fiber of inferior quality is being substituted for abacá, solely because of the abnormally high prices of the latter, which are due to limited production and the excessive cost of hand stripping.

The introduction of an abacá-stripping machine has been encouraged by this bureau, both in these islands and the United States. By means of correspondence, and through the columns of the Scientific American, this subject has been brought to the attention of American inventors and manufacturers, with several of whom we are now in communication. To our local inventors we have offered every possible encouragement and assistance in the way of suggestion, war material, and facilities for testing machines.

Although no fiber-extracting machine for abacá has, as yet, been introduced, there has been definite progress toward the perfection of such a machine. During the past half year

two different machines have been officially tested by this bureau. The model of a third machine has been submitted for our inspection, and the machine itself will be ready for use within a few weeks. In the tests which have been made it has been considered that any practical machine for stripping abacá should meet the following conditions:

(1) The production of a satisfactory quality of fiber.

(2) A material reduction in the cost of the operation over the present hand-stripping process.

(3) The production of a maximum quantity of clean fiber and the minimum quantity of waste.

(4) That the machine be sufficiently simple in construction and operation, and of such durability and weight as to make its operation profitable in the abacá districts.

The first machine which we tested cleaned a superior quality of fiber, but did not satisfactorily meet the other three conditions. An effort is now being made by the inventor to perfect this machine. The second machine tested was a failure.

ABACÁ WASTE.

The investigation relative to the use of abacá waste for the manufacture of paper, to which attention was invited in our last annual report, is still in progress. The principal objects of this investigation have been, first, to obtain as complete data as possible showing the actual value of abacá waste as a paper material, and, second, to learn if the waste can be profitably exported to foreign countries.

A shipment of about 600 pounds of this waste was received from the San Ramón government farm in October, 1904. A portion of this shipment was sent by mail and parcel post to the leading paper manufacturers of Great Britain, France, China, Japan, and the United States, and to the Bureau of Chemistry of the United States Department of Agriculture. The balance of this San Ramón waste was put up in bales at one of the abacá pressing establishments in this city, these bales being forwarded to Yokohama and New York. Up to the present time we have received reports on this material from manufacturers in England, Scotland, France, Shanghai, and the United States. The summary of these reports is that abacá waste is not suitable for making the finer grades of paper, but that it can be used for wrapping paper.

The second question, viz, the practicability of exporting abacá waste, is yet to be determined. One material with which this waste would have to compete is old Manila rope. The price of this old rope varies sowewhat, but is about 2 cents gold per pound. In November, 1904, it was quoted in New York City at 1.8 cents and in February, 1905, at 2.2 cents per pound. If further experiment demonstrates that abacá waste compares favorably with this old rope as a paper-making material the question will be whether the waste can be profitably delivered in the United States at a figure approximating $40 gold per ton.

The additional evidence which we now have that abacá waste is a satisfactory material for making certain grades of paper, emphasizes the desirability of establishing a paper manufacturing plant in the Philippine Islands.

MAGUEY, INTRODUCTION OF FIBER-EXTRACTING MACHINES.

There has recently been imported into Laoag, Ilocos Norte an improved "Prieto" fiber-extracting machine. This machine, which has been set up and is now being successfully operated, is located at a central point in one of the principal maguey producing provinces. As the old method of extracting maguey fiber by the process of retting was most unsatisfactory, the introduction of this machine is an important step toward the establishment of the maguey industry on a more satisfactory basis. The use of fiber-extracting machines will tend to encourage the more extensive planting of maguey and will enable the Ilocos planters to turn out a fiber which can compete with the sisal of other countries.

A machine of quite a different type from the Prieto has just been received by this bureau from Mazatlan, Mexico. The principal objections to the Prieto machine are, that it is not portable, and that it is too expensive for the average planter to own and operate. The Mazatlan machine, on the other hand, is comparatively small and light, and could be transported without difficulty from one plantation to another. It is also sufficiently inexpensive to be owned by any planter of ordinary means. This machine is extensively used on the Mexican plantations. It will be tested by this bureau, and if found to work satisfactorily with the Philippine maguey will be introduced in the maguey provinces.

IMPORTATION OF SISAL PLANTS FROM THE HAWAIIAN ISLANDS.

In November, 1904, we received 10,000 "pole" plants of sisal hemp from the Hawaiian Islands. These plants were imported for the purpose of introducing a plant that should produce a superior fiber to the maguey which is now cultivated. The plants from Hawaii reached Manila in excellent condition and were distributed as follows: Five thousand to the

La Carlota experiment station, 500 to the Batangas experiment station, and the remainder in lots of 500 each to a selected list of planters in several of the maguey provinces. These plants have been received with great favor and we are in receipt of numerous requests for other and larger allotments.

COTTON.

In October, 1904, a circular letter was sent out by this bureau to the various provincial governors, in which attention was invited to the fact that the most favorable time for planting cotton in the Philippine Islands is toward the close of the wet season; and also that the bureau of agriculture would furnish seed to any planter interested in cotton growing. This step was taken with a view of stimulating a more general interest in cotton growing and for the purpose of obtaining more complete data showing what results may be expected with cotton in the different provinces. In reply to this letter we received more than two hundred requests for cotton seed, representing 37 different provinces, or practically the entire archipelago, which shows that the interest in cotton is not confined to any one part of the islands. From September, 1904, to January, 1905, we distributed 4,165 pounds of cotton seed, principally in small allotments of 3 and 4 pounds each. It is believed that the reports which we may expect to receive from these experimental plantings of cotton should furnish information of considerable value.

OTHER PHILIPPINE FIBERS.

Cocoanut fiber (coir) is produced in large quantities in the Philippine Islands and should be one of our valuable commercial fibers. It is probable that this fiber will soon become an article of export as a plant, for the manufacture of both cocoanut oil and coir has been established in Tayabas Province during the past year, the necessary machinery for extracting and cleaning coir having been imported from England.

The cotton tree, producing kapok, is found in all parts of the islands. This fiber has a very extensive local use and is an article of interisland trade. Up to the present time it has not been produced in sufficient quantities for export, principally for the reason that there is no kapok-cleaning machinery in the islands. One of the leading commercial houses in Manila is now considering the importation of machinery for handling this fiber.

Bowstring hemp (*Sansevieria sp.*), known locally as "lion's tail" and "culebra," is found in many of the provinces. This plant produces a fiber superior to either maguey or sisal. We have received a number of inquiries concerning it during the past year, and in reply to one of these inquiries a brief report on sansevieria was published in one of the Manila papers. The cultivation of this plant has been taken up in the provinces of Negros and Laguna.

The production of ramie has, in general, given such unsatisfactory results in other parts of the world that no attempt has been made to encourage its immediate cultivation in the Philippine Islands. In view, however, of the possible future development of the ramie industry we have been in communication with a number of different ramie planters, and have received reports on this plant and fiber from Singapore, India, Sumatra, and Ceylon.

FIBER COLLECTION.

With the very courteous assistance of a number of provincial officials we have been able to materially enlarge our collection of Philippine fibers. Excellent specimens of abacá have been received during the year from the Moro Province, Surigao, Bohol, Negros Oriental, and Negros Occidental. Cotton, maguey, sansevieria, and fibers of local importance have also been received from various parts of the islands. A representative collection from each province of the different fibers, and of the different grades of the more important commercial fibers, furnishes one of the most satisfactory means of showing prospective planters and investors of capital who visit this bureau what is being done in different parts of the islands.

FIELD INVESTIGATIONS.

In January, 1904, an investigation was made by this bureau of the abacá industry in the district of Dávao, in southern Mindanao. The conditions in this district were found to be very favorable for the cultivation of abacá, and a report on the abacá industry in Dávao was published by the bureau. This investigation and report have resulted in the formation of several plantation companies, and the investment of a considerable amount of capital. A second inspection of conditions in Dávao, made in February, 1905, showed that in twelve months the monthly exports of abacá have increased from 1,200 to 2,800 piculs, and that the number of American planters in the district has more than doubled. As a large part of this development has been the direct result of the reports issued by this bureau, it is believed that similar investigations in other undeveloped districts might be advantageously made.

CONCLUSION.

During the period covered by this report there has been a noticeable improvement in the general condition of the abacá industry. The quality of fiber produced is more satisfactory than it was a year ago; a number of different fiber-extracting machines for abacá are now in course of construction; there is a reasonable prospect that the long-neglected abacá waste will soon become a commercial product; the cultivation of abacá is now being undertaken to a considerable extent by American capital and by American planters in these islands.

The introduction of fiber-extracting machinery and the importation of sisal from Hawaii places the maguey industry on a much more satisfactory basis than it has ever been before and opens the way for new development. The introduction of machinery for the extraction and cleaning of cocoanut fiber marks the beginning of the utilization of this valuable Philippine product which has too long been wasted. The probable importation in the near future of machinery for cleaning kapok should result in raising this fiber from an article of inter-island trade to an exported product. The experimental work which is being done this present season with cotton by native planters throughout the islands under the encouragement of this bureau will give us more definite data on which to determine the practicability of developing a cotton-growing industry in the Philippine Islands.

Very respectfully,

H. T. EDWARDS, *Fiber Expert.*

The CHIEF, BUREAU OF AGRICULTURE,
Manila.

EXHIBIT B.

MANILA, P. I., *September 1, 1905.*

SIR: I have the honor to submit herewith report of the division of seed and plant introduction for the year ended August 31, 1905.

During the year a total of 21,524 packets of various seeds were distributed to 3,827 persons. Fifty-seven per cent of all the applications for seed were for vegetable garden seeds only, and 74 per cent of all the seeds issued were of this kind. The other 43 per cent of applications called for "seed," kinds unspecified, while a total of only 130, or less than 3½ per cent of the applications, were for seeds of staple farm crops.

The relatively large inquiry for garden seeds is due to the fact that 98 per cent of all applications from the public schools, from army posts, and from the constabulary were for straight garden seeds.

The requests from the military and police posts do not disguise the fact that the only end in view is the raising of a supply of fresh garden truck. The schools, however, are conscientiously subordinating this end to that of agricultural instruction, but have temporarily lost sight of the very minor part that truck growing (outside of great centers of population) plays in a strictly agricultural country.

This is now being changed by the schools, but the influence of only one season's work is manifest by the applications of last year's pupils for garden seeds and no others.

While it would have been more satisfactory to have aroused a wider interest in the planting of those staple food and forage crops, upon which the future stability of the agriculture of these islands rests, I am not disposed to belittle the utility of vegetable growing as a factor in elevating the Filipino standard of living. I have, indeed, deemed the subject of sufficient moment to incorporate with this report a paper which embodies the gist of our knowledge upon vegetable growing up to this time.

In that paper attention is invited to the better general results which may be expected from plantings made in October and November. At that time, however, it is entirely impossible to procure seeds of the current season's growth, and we are at the disadvantage of using seeds that are more than one year old.

The seed harvest in Europe and the United States is mostly gathered in September and October and from two to three months are consumed in the different warehouse processes of curing, cleaning, grading, packing, and in the long over-sea journey. The earliest possible planting time of new seeds is, therefore, January. At this time it is possible to plant the rapidly maturing salad crops, but conditions are then unequivocally bad for onions and most root crops, as well as for peas, celery, cabbages, and other plants of far northern origin.

The alternative, then, is to purchase seeds of the preceding year and expect the greater loss from their earlier deterioration in a hot, humid climate than would occur were seeds of the current year available for October and November planting.

Such losses, I regret to report, frequently occur before the seeds can be repacked and distributed to distant points in the islands.

Our experiments have proven that many exotic vegetables come to flower here and perfect a good quality of seed. These, if subjected to the well-known standards of selection that prevail on modern seed farms, would be quite as useful as the best imported seeds.

As far as practicable, the scope of the bureau's planting for seed purposes will be enlarged, to the end of meeting its own requirements. The situation also suggests a field for private enterprise in commercial seed growing that would meet the requirements of truck growers, farmers, and the government, whose wants could be filled with fresh and reliable seeds at the season when most wanted.

While some of our own as well as outside plantings of garden seeds have been somewhat unsuccessful during the current rainy season, I have, on the other hand, to report excellent success with the wet-season planting of most of our farm seeds—a result happily confirmed by a good share of those whom we induced to make such plantings.

Of these plantings, the lead is still maintained with the sorghums, both sweet and non-saccharine, although field corn, cowpeas, peanuts, teosinte, and velvet beans have given full demonstration of their perfect adaptability to wet-season conditions.

NEW INTRODUCTIONS.

During the year we have made field trials of tuberous rooted artichoke, a cyperus or nut grass, known as "chufas," a species of *Xanthosoma*, known as "Tanias."

The first two are perennial, tuberous rooted plants, which probably call for less cultural attention than any plant yet introduced into these islands.

Both are of undoubted value as human food and for fattening swine.

The value of the first is probably local, as the tubers are difficult to preserve. This may possibly be overcome by drying them over gentle heat, and experiments looking to this end are now under way.

Chufas are highly esteemed in Spain as human food, at a price which prevents their common use for stock feeding, and it is likely that a similar market could be developed in these islands.

Both artichokes and chufas are profitably harvested by turning hogs upon the inclosure wherein they are grown.

Two bulbs of tanias sent to this bureau by the United States Experiment Station at Porto Rico about four months ago have now multiplied about twentyfold.

Tanias are a staple West Indian article of diet, closely related to the "gabe," so extensively consumed in the Philippines. Our plants have developed some 10-ounce tubers grown during the wet season, but without irrigation, and offer some possible advantages over our gabe, which can only be grown to large size under irrigation.

Importations of a number of fruit and other economic plants have been made during the past season which are either new to the Philippine Islands or which occur so sparingly that they are practically unknown. Among those that in habit and vigor of growth give promise of future utility are: *Bouea*, a Javan fruit tree; *Durio zebethinus*, the durion that does not occur north of our islands of the Sulú Sea; *Erythroxylon coco*, the cocaine plant; *Strychnos Nux-vomica*, the strychnine plant; *Agle marmelos*, the Indian bael fruit; *Genipa americana*, West Indian genip fruit; *Flacourtia cataphracta*, the Javan lobu-lobu fruit; *Zalaca indica*, an edible palm fruit; *Chrysophyllum cainito*, West Indian star apple; *Mimusops elangi*, East Indian fruit; *Mimusops indica*, East Indian fruit; mangoes of varieties not yet produced in these islands.

The foregoing plants, with the exception of Genipa, are not yet grown in quantities larger than required for the demonstration work of the bureau, and in consequence are not available for public distribution. We have nevertheless tested and multiplied in considerable quantities a number of useful economic plants, which are now subject to distribution during the present dry season, and others which will be ready for delivery at the next wet season.

Among the first are European grapevines. These have fruited with us but sparingly, but the vines are still young, and when they are three or more years old better results are to be expected. An essential to any success with all grapes in the Tropics are two severe prunings a year. August and January are the most suitable months in western Luzón in which to perform this operation.

Strawberries are grown only for purposes of distribution to elevated districts. At sea level they are practically unproductive, but at Trinidad (Benguit Province) they are quite prolific and may be grown anywhere in the Philippine Islands at an elevation of more than 1,000 meters with a good promise of success.

Among those intended for planting at the opening of the next rainy season are *Anona cherimoya*, a "sour sop," which is esteemed a much better fruit than the "sweet ate" (*Anona squamosa*), which occurs so commonly in the Filipino markets.

The same may be said of *Psidium araca*, a Brazilian guava, which is rated as far superior to the variety that is found in these islands.

Of oranges, abundant scions for budding can be supplied of the best Japanese and California varieties.

The first-named varieties are fruiting heavily at three years of age, but remain, when ripe, so acid as to serve only as a substitute for lemons. They will not color in this climate, but develop an extraordinary amount of juice.

California varieties of the same age have not yet produced any fruits.

Lemons of European and American origin have failed, but young plants of a good native variety, obtained through the efforts of the secretary of the interior, will be ready for distribution at the next planting season.

Mulberries, indigenous to the Philippine Islands, and highly commended by the Italian Government for sericulture, will be available for their fruit, as well as a food supply for the silk worms lately introduced by this bureau into the archipelago.

Liberian coffee is offered as one of the varieties which experience has proved to be immune from the attacks of the destructive leaf spot disease. Standing testimony of this is to be seen in the thrifty Genato plantation of Liberian trees near San José, Batangas, which is untouched by disease in a center of the worst contamination found in the Philippine Islands.

Florida and West Indian pineapples have been introduced in several varieties. These are of less showy color than the handsome red fruits so largely grown in Bulacan, but are, as a rule, sweeter, more buttery, and less fibrous than the Philippine variety.

Among plants of interest, but minor utility, we have *Santalum album*, the tree from which the fragrant and costly sandal wood is taken; *Crescentia cujete*, the calabash tree, the fruits of which are converted into a variety of household utensils; *Castanospermum australe*, the Moreton Bay chestnut, and *Genipa americana*, a jasmine-like tree producing edible berries.

The great interest which has been taken in the development of the fiber industry also prompted the importation of ramie and several species of Sansevieria, other than the common *S. zeylanica*, that abounds in these islands. These accessions are doing well, and will be made the subject of later distributions.

VEGETABLE GARDENING AND TRUCK FARMING IN THE PHILIPPINES.

As the result of three years' experiments on the different stations of the bureau, and from the study of data obtained from several hundred individual planters in the various parts of the archipelago, the bureau has arrived at definite conclusions as to vegetable growing and truck farming in these islands.

While our experiments have been progressing investigations along similar lines have been undertaken by the government of the tropical French colonies of Indo-China, and it is of interest to note in their reports a general concurrence of the results obtained here. There, as here, the dry cooler season is the time when the best general success may be expected with most exotic vegetables, and especially with those derived from far northern latitudes.

Our conclusions are derived from experiments conducted at elevations running from the sea level up to 300 meters, a range that probably covers three-quarters of the arable lands and most populous farming districts in the archipelago.

When, as will be noted further on, some vegetables are described as failures it will be understood to mean their behavior within the limits named. This will also include varieties of a yield so insufficient and quality so inferior as not to reimburse the gardener for the seed and labor invested.

At higher altitudes conditions are so modified that many vegetables flourish there which either fail or give partly negative results in the lowlands.

At great altitudes the same planting season must be observed in order to avoid the heavy summer rainfall and the frequent destruction of seeds and seedlings which occurs when summer plantings are made. Planting at the proper season makes available the high mountain plateaus of northern Luzón and central Mindanao for potatoes, onions, cauliflower, spinach, and garden peas, which, grown at sea level, at best are but qualified as failures.

The above are products peculiarly attractive to the commercial grower as they will endure long transit without serious deterioration.

As soon as reasonably cheap and rapid transportation facilities are afforded to seaport towns or interior centers of population the truck industry in those regions can hardly prove other than a remunerative enterprise.

Notwithstanding the general planting restrictions imposed, we can fortunately record a few vegetables that flourish during all seasons. Foremost among these is indisputably okra (gumbo), which never fails to respond with its abundant and wholesome fruits at all seasons and in all localities.

In successive order of suitability for planting at all times comes eggplant, pepper, radish, beans of several kinds, lettuce, endive, mustard, beets, carrots, and sweet corn.

Those succeeding in the dry cool season include, of course, the foregoing, and also embrace asparagus, tomatoes, turnips, cabbage, squash, peas, spinach, onions, parsley, cucumbers,

and celery as tops, and in rarely favored localities muskmelons and watermelons. Cauliflower, kohlrabi, kale, brussel sprouts, rhubarb, salsify, parsnips, leeks, chives, and French artichokes, though still the subject of investigation, have so far failed. While cool dry-season planting is giving the best results it must, for many vegetables, be supplemented with irrigation.

It may happen (as in 1904) that the rainfall in December is sufficient to mature many vegetables, but in general that month, with a mean precipitation of only 58 mm. at Manila, must, for the west coast, be classed with the succeeding four as a dry month.

October, with a normal mean rainfall of 195.1 mm., and November, with 138.2, give assurance of the frequent gentle showers which conduce to a good start of everything planted at that time.

With December also comes a marked decline in the temperature to a daily mean of 77.4° F. from the 83.9° that prevails in May. The contrast between the actual mean monthly minima is still more sharply defined, being only 65.3° F. for December and rising to 73° F. in May.

This analysis serves to illustrate that what we call our cool dry season corresponds more nearly to the climatic conditions that prevail during the growing and fruiting season in countries where our best garden vegetables have originated, and that in theory, as in practice, this is the most acceptable time for planting.

For vegetables of tardy development, such as cabbage, tomatoes, onions, and most of the root crops that require three to five months to arrive at maturity, early October planting is necessary for best success.

Radishes, lettuce, squash, beans, and cucumbers, which mature their fruits in from three to six weeks from seeding, may be sown for successive crops continuously from October 1 to March 1. Peas and spinach also develop with marked rapidity, but are so sensitive to the influence of a slight increase of temperature that at sea level they may only be sown in November and December in order to fruit them in January and February, when the mean temperature is the lowest.

There are, nevertheless, many factors in vegetable growing other than climatic which call for the undivided attention of the cultivator.

There are some plants that will stoutly resist protracted heat and drought but quickly succumb to insect pests; others of like endurance and unsusceptible to ordinary insect attack that will soon yield to disease. General immunity from these enemies strongly commends to the grower okra, eggplant, peppers, asparagus, radish, lettuce, endive, mustard, spinach, and carrots.

In the winter season nearly all beans (pole, Lima, and snap varieties) are more or less subject to the attack of mildews, although it must be said that they are more easily controlled by dusting with flowers of sulphur than in temperate climates.

Early (October) sown beets are generally sure to make a good crop; late sowings are mostly subject to the attack of a leaf miner. Sweet corn sown as a wet-season crop most times escapes the attacks of cutworms, but on the other hand is always exposed to the risk of lodgment during heavy storms.

Cabbages invariably are attacked by both cutworms and a true cabbage worm. These must be kept down by hand picking and frequent dusting with Paris green in the earlier stages of growth.

Given early planting, heavy manuring, irrigation, good tilth, and unremitting warfare against worms cabbage growing at sea level may be made a profitable feature of truck growing. Pumpkins, squashes, cucumbers, water and musk melons are subject in their early stages to the ravage of a small spotted squash beetle, and call for like vigilance in the use of Paris green.

An intelligent Japanese collaborator of the bureau in Pampanga claims to have secured entire immunity from the attacks of these beetles by sprinkling the seedlings with finely chopped wild grass. As the plants grow he renews the application every few days, covering only to an extent to prevent smothering. When the plants finally emerge from the mulch they are strong enough to resist the attack of the insect. The remedy is simple and certainly worthy of trial.

Cucumbers and all kinds of melons are extremely subject to a wilt disease that often annihilates them at the moment of greatest promise. Our experience with melons has not been promising, but a number of correspondents report excellent success on thin sandy soils that are slightly shaded with such sparse-leaved plants as the spiny acacia or the madre de cacao.

Tomatoes are an erratic crop. Excellent reports have been received from some quarters, but market gardens along the Pasig, which in 1904 produced enormous crops, were this year almost barren, and like experiences were not uncommon in other localities.

A root borer was prolific of much injury to the plantings made by the bureau, but its attacks were insufficient to explain the variability in bearing over the archipelago.

Below, in tabular form, is given a list of 24 exotic vegetables that have been cultivated in these islands, and the rating of each is given in relation to immunity from disease, insects, and excess or scarcity of moisture, 100 representing the maximum of excellence:

Okra	100	Beets	70
Endive	90	Celery	70
Radish	90	Sweet corn	60
Lettuce	90	Tomatoes	60
Eggplant	90	Spinach	60
Pepper	90	Cabbage	50
Mustard	90	Turnips	40
Asparagus	80	Peas	30
Beans, pole	80	Onions	20
Carrots	80	Cucumber	20
Squash	80	Watermelon	10
Beans, bush	70	Muskmelon	10

It must be remembered that this table is based upon normal averages over many parts of the archipelago, and is not affected by the occasional report of big returns from crops numbered 12 to 18, inclusive.

It will be seen that planting in the numerical order given in the table is apt to give the grower the best all around results.

From this it also appears that the first 7 varieties may be planted by the truck farmer with a strong assurance of profit, the next 12 with more or less chances of success, and the final 5 with but little, if any, encouragement.

To the truck grower whose garden is remote from market a slow crop maturity is sometimes advantageous, as the keeping quality of the products is increased. Quality, however, is always impaired, and the aim of the near-by grower should be to secure the tenderness so appreciated in all salad and root crops.

To this end abundant manuring, plenty of water, and frequent tillage are required. For most garden truck the soil can hardly be too heavily enriched with stable manures, and further fortified at the time of planting with ammonia salts, oil cake, or any of the substitutes that abound in nitrogen.

Before concluding, attention is invited to a few of our native vegetables which merit cultivation by truck gardeners who especially cater to the tastes of American and European consumers.

Some of these, in point of crop assurance and freedom from disease, are not only entitled to first place in our select list, but are enormously productive and subject to still further increase under good management.

Some of the native vegetables have a distinct bitter flavor, which in general does not appeal to the foreign palate. On the other hand we have:

Squash.—The dark green native calabasa, which in sweetness and prolific bearing is unsurpassed by any foreign introduction.

Patani (a species of phaseolus).—Has most of the qualities of a good Lima bean, with the single drawback that the outer integument of the seed is somewhat tougher than that of the improved Lima. This, too, is quite unrivaled in productiveness, the writer knowing a single vine that supplied a family of three persons with a good mess on alternate days for a period extending over six months.

Seguidillas (or asparagus pea).—Produces an excellent and abundant pod, which, like okra, in order to be appreciated must be taken only when young and tender.

Sincamás (pachyrrizus).—May be eaten raw, or, when boiled, makes a good substitute for turnips.

A number of native wild sweet potatoes, such as *Tugui* and *Nami*, when carefully prepared are not inferior to the finest yams cultivated in the southern United States.

It is quite certain that further acquaintance with these native vegetables will stimulate a demand for them, and that their culture on a commercial scale will prove remunerative.

Very respectfully,

WM. S. LYON,
Horticulturist.

The CHIEF, BUREAU OF AGRICULTURE,
Manila.

EXHIBIT C.

BATANGAS, P. I., *August 12, 1905.*

SIR: In accordance with your instructions of July 22, I have the honor to submit herewith my report of Batangas experimental station for the year ending August 31, 1905.

The station is located on what might be described as lowland, the highest point being less than 20 feet above sea level. The soil may be classified as heavy loam. Previous to its being occupied as an experimental station the land had been impoverished by repeated crops of corn, sugar cane, and rice. The trials of vegetables, referred to below, were made in well-drained soil, which had been fertilized with stable manure. In fact, everything grown here has been fertilized except the cotton.

During the last year no help has been employed, either in cultivating the land or caring for the stock, except natives. On the whole they have proven quite satisfactory.

FORAGE CROPS.

Teosinte has, during the wet season at this station, grown like weeds, to use a farmer's expression. Without irrigation, during the dry season, it made little headway. A field which had been heavily fertilized with stable manure and plowed under in January was, after thorough plowing and harrowing, planted to teosinte on the 4th of the following May. In the latter part of July a portion of this crop, cut and weighed, indicated a yield of 30 tons per acre.

Our experience seems to indicate that the best time to cut teosinte is when it is about 4 feet high. It then sprouts up again much more quickly than when allowed to grow to full size before cutting. We found that where it grew rank and thick and was left standing until full grown many of the roots failed to sprout again after being cut. Compared with Kaffir corn and sorghum as a dry-season crop, the advantage is entirely with the latter.

Sorghum planted at different times during the wet season has invariably produced a good crop, or, rather, good crops, for we have cut three crops from one planting. Needing feed for our stock, we cut all of these crops while green, so no estimate was made of the yield of seed.

Kaffir corn, like teosinte and sorghum, grows luxuriantly at this station, but seems peculiarly susceptible to the attacks of insects during the dry season. A crop maturing in the month of April was so infested with plant lice as to render it almost unfit for feed. This was remarkable from the fact that on adjoining plots teosinte and sorghum were almost if not entirely free from this pest. The grain, also, of Kaffir corn seems to offer less resistance to the attacks of weevils than that of sorghum.

Comparing teosinte, Kaffir corn, and sorghum, experience at this station would point out the last named as far in the lead as a forage plant for this province.

Giant beggar weed sown in January and irrigated through the dry season produced two heavy crops, which were cut for seed. It is now growing up for the third time. Both horses and cattle are fond of this plant. If sown about the 1st of October it would probably produce two crops, which could be cut and cured during the dry season. It seems well adapted to this soil.

FIBER CROPS.

In November, 1904, 500 sisal shoots which had been imported from the Hawaiian Islands were received at this station. They were set out in well-drained soil in rows 20 inches apart, and 10 inches apart in the rows. As the weather following that date was very dry, they were watered by hand once a week until they became rooted. At this date (August 12) the leaves of these plants average 15 inches long, many of the more thrifty ones being 20 inches or more. With the exception of the mealy bug this sisal seems to be free from insect enemies. Had these shoots been set out at the beginning of the rainy season instead of at its close, it is reasonable to suppose that they would have attained a far greater size in the same length of time—eight and a half months.

Planted on the 24th of June last, jute seed came up in a few days and the plants made a fine, vigorous growth. Forty days after planting they were 3 feet high, but within the last ten days caterpillars have made a raid on them which threatens to be very serious.

Cotton, of the variety known as Boyd's Prolific, was planted on November 25, in soil well worked and in good condition. Following that date we had no rainfall until February 15 and 16, when 0.83 inch fell. What with the drought, plant lice, and a small boll weevil, this cotton was practically a failure. Other cotton planted in the neighborhood by Filipino farmers was an equal failure.

CORN.

While our different plantings of imported American seed have shown some fine ears, the crops as a whole can not be said to have been uniformly good. There were too many small ears as well as a considerable percentage of poorly filled ones. Both the Golden Dent and White Dent varieties of field corn showed a tendency to leave the ends of the ears more or less exposed, affording free access to the ear of caterpillars, ants, and weevils, which make heavy inroads into the grain. Of the two varieties tried the results were much the same—not a failure, yet not so much of a success as was to be expected.

CASSAVA.

A plot of cassava planted in September with native seed made a good growth while the rains lasted. On the lower portion of the plot where the soil held the moisture these plants continued to grow through the dry season, but on the higher ground they made little headway, except where they were irrigated. The plants, however, presented a healthy appearance, and with the exception of a few mealy bugs showed no sign of insect enemies. When the rains began again in April they continued their growth and attained (August 1) a height of from 10 to 12 feet. Ten months after planting this plot yielded at the rate of 14 tons of roots per acre.

VELVET AND SOJA BEANS.

Velvet beans, planted in drills 4 feet apart and 8 inches apart in the drills, covered the intervening spaces so as to choke out grass and weeds. Having been planted in June, a small portion of this crop of seed was lost by becoming mildewed, they having matured while the wet season was still on. Notwithstanding this loss, we harvested 1,600 pounds per acre of good beans. Barring a few odd mealy bugs, these vines showed no signs of insect attacks. This bean seems to be at home in this soil and climate, and at this station is an entire success.

Japanese soja beans, like the velvet beans, were planted too early in the season. Maturing before the velvet beans, a large percentage of this crop was spoiled by wet weather. These vines grew up in symmetrical bunches and appeared healthy and strong, but the yield of seeds was much smaller than that of the velvet beans.

Peanuts of a small Spanish variety, which had been grown at this station were planted in August. Although the soil in which they were grown was a heavy loam, we gathered 18 bushels per acre. The vines were fed to the horses and mules, both of which seemed to prefer them to imported hay.

The results of two lots of sunflower seeds planted in July and September were practically the same—fine, large stalks, from 6 to 8 feet high, with an abundance of large flowers, some 10 inches in diameter, full of hollow seeds. Probably not more than 10 per cent of the seeds were well filled.

Sugar cane seems well adapted to this soil. A few seeds of a variety imported from the Hawaiian Islands were planted in January, 1904. A year from that time they had produced some splendid samples of cane, which were distributed as seed among the local cane growers. A few of these seeds planted at this station March 9, 1905, are now all a cane grower could wish for.

On December 13 two varieties of string beans—Golden Wax and Red Valentine—were planted in adjoining plots. The former were entirely destroyed by insects. A portion of the latter survived and bore some fair fruit. On July 13 of this year another lot of Golden Wax beans was planted in another part of the station, a considerable distance from the former plot. This lot will probably not survive, for at this date (August 12) they look very bad. A dipterous insect appears to have deposited its eggs in the stem, the usual point of attack being just above the surface of the ground. When these eggs hatch out the maggots burrow through the stem and usually destroy the plant.

Cabbage could be successfully grown at this station if it were not for caterpillars. From the Early Summer variety we got a few heads, which, while small, were of a very good quality. Caterpillars attacked them at all stages of development. Even after the head was half grown they would in some cases entirely honeycomb it in a few days.

Tomatoes, like cabbage, would have been good had it not been for the insects. Of two lots transplanted from boxes in October and November the results were the same—fine, large plants with correspondingly large fruit. Probably half of this fruit was destroyed by worms before reaching maturity. These worms were of both dipterous and lepidopterous insects.

The following vegetables were successfully grown at this station: Asparagus, beets, carrots, eggplant, lettuce, peppers, radishes, onions, and okra.

While the above vegetables can be grown during every month of the year, they all do better during the cooler months, and, of course, must be irrigated in the dry season.

COFFEE.

In January, 1905, about half of the coffee plantation at Lipa was turned over to the owner of the land. This left about 5 acres, which have been cared for by one man with a bull, a plow, a cultivator, and a hoe. On July 15 native mongo seed was sown broadcast among the coffee trees. It is expected that these vines will not only enrich the soil, but very materially aid in keeping down grass and weeds.

The result of cultivation can easily be seen when this 5-acre lot is compared with the other portion, which was somewhat neglected during the dry season. While these trees show some few indications of the presence of the leaf miner, they are making a vigorous growth, and will bear some fruit this year. They give every promise of making fine, bushy trees.

Rainfall, beginning January 1, 1905.

	Inches.
January	0.00
February	.91
March	.04
April	7.04
May	.00
June	7.66
July	17.07

ANIMALS.

Two stallions—a full-blood Arabian and a Morgan—were received at this station on September 16, 1904. One month later a Kentucky jack arrived from Manila.

Through the courtesy of the governor of the province information was sent to all the municipal presidentes of the province to the effect that these animals were at this station, and that any one wishing to breed mares to them could do so free of charge by bringing his mares to the station. The number of mares brought in was disappointing. Consequently the stallions were taken out to the outlying barrios. The greater portion of the mares of this province are owned by poor farmers. It was found that those who had one or two mares—usually only one—were willing, even anxious, to breed their mares to either of the horses or the jack, but in spite of all solicitations to bring their mares to the station for breeding they failed to come in. Why this was so I am unable at this time to say.

The Arabian, being more easily handled than the Morgan, was taken into the country a greater number of times; consequently more mares were bred to him. Unfortunately this stallion died April 18 of colic.

The Morgan stallion and the jack have been in good health and condition since their arrival. These animals have been fed almost entirely on feed produced at this station. The mares bred being scattered over a good portion of the province, I am unable to report the number pregnant.

	Number.
Mares bred to the Arabian stallion	51
Mares bred to the Morgan stallion	21
Mares bred to the jack	15
Total	87

A record of all the mares bred has been included in my weekly reports.

A colt from the Morgan stallion was foaled last night by a small native mare 5 years old, ten months and eleven days after service of horse. Both mare and colt are in good condition.

Very respectfully,

HUGH J. GALLAGHER, *Superintendent.*

The CHIEF OF THE BUREAU OF AGRICULTURE,
Manila.

EXHIBIT D.

GOVERNMENT RICE FARM,
Murcia, Tárlac, September 1, 1905.

SIR: In compliance with your instructions of July 22 I have the honor herewith to render my report of the government rice farm for the year ended August 31, 1905.

Although temporarily stationed at this farm at intervals during the past year repairing machinery and operating steam thrasher and plowing engine I have been in charge of the station only since May 15, 1905.

The rice crop mentioned in last year's report, both the drilled and that transplanted in the native way, was large and of good quality. The crop was, indeed, good for this soil, which is thin and quite sandy, and about the poorest spot in the province, according to the opinion of almost every farmer who visits the station.

Harvesting was done in December and January with self-binders. Much of the rice was too ripe when harvesting was done and consequently there was considerable loss. The delay was largely caused by an outbreak of surra that destroyed the majority of the work animals on the place.

The self-rake reaper without the binder I consider a much better machine for our conditions, and it will be used the coming season. This machine is light, being easily drawn by two horses and can be readily operated by a native teamster. No binder twine will be needed, and I believe the waste of grain will be materially less.

THRASHING.

During the month of December a self-feeder, elevator, weigher, and wind stacker were attached to the Garr-Scott separator mentioned in report of thrashing March 26, 1904. These accessories saved the labor of 15 men, the wind stacker being the most important of the three attachments.

One of the most serious problems confronting one who plants on a large scale is that six weeks' difference in planting rice does not make ten days' difference in time of harvesting. Rice planted June 1 to July 15 is all ready to cut December 1 to 15. A planter can drill and transplant from June 1 to September 15 and all this grain is ready to cut from November 25 to December 15, and it is necessary to have a large force of laborers to prevent loss. For this reason alone reapers should be speeded up faster and carabaos or oxen used in harvesting crops, making it possible, with the same number of laborers, to care successfully for a much larger area. Especially is this true since the introduction of the modern steam thrasher. Three of these were in operation in this province the past season. These machines thrash a large amount of rice in a short time, thereby removing another barrier to extensive planting. Formerly a landowner planted only what his tenants could harvest and thrash in a given time; now it is possible to plant all he desires, machinery making it possible to care for all the crop in a short time.

STRAW.

One hundred and forty tons of good, bright straw were baled with a 2-horse, full-circle hay press. Seventy-five tons were shipped to Manila for use in government stables.

Straw usually sells for $10, United States currency, per ton. The native farmer burns it up to get rid of it. Manila and several cavalry posts afford a good market for a limited quantity, and it is an item which should not be overlooked. A steam press has arrived, but did not reach the farm early enough to be put in operation this past season.

STEAM PLOWING.

A 35-horsepower plowing engine with a gang of six 14-inch plows was shipped to this station in January. This outfit does perfectly satisfactory work at all times when the ground is in fairly good condition. It turns the cogon grass lands without difficulty and will plow about 12 acres in ten hours.

COST OF PLOWING.

Some calculations and some careful tests have been made as to the cost of plowing per acre. The following items will show the expenses of a day's work:

One engineer	$4.00
Four laborers, at 30 cents	1.20
One team and two laborers, hauling fuel and water	3.50
1,800 pounds coal, at $7 per ton	6.30
Oil	.75
Minor repairs	1.00
Depreciation 15 per cent on $4,000 value, $600, divided by 125 working days (estimated)	4.80
Total	21.55

This is about $1.80, United States currency, per acre.

With wood near the scene of operations considerable saving can be made, as 900 sticks of wood, which may be cut for $2.70, will run the engine for ten hours. In case the plowing engine could be used 250 days instead of 125, another material reduction in expense for each

day's work (and, consequently, each acre plowed) would be effected. This might be accomplished by using the engine for any of the purposes for which other engines are required.

We find that one set of shares will plow 200 acres of sandy land, and the same number should plow 400 acres of clay land.

An 18-horsepower thrashing engine was used to do some plowing with two sets of disk plows, cutting 5 feet in all. It worked satisfactorily and as cheaply as the regular plowing engine, but it is doubtful if it would stand the work as well and last as long.

For drilling rice a 10-horsepower traction engine was used to good advantage until the land became too wet from the early rains. This work was then continued with teams and finally, when the drill would no longer work, the land was marked off and the seed sown in drills by hand.

It is necessary to sow rice in drills to facilitate weeding. A good crop can hardly be expected from seeded rice without weeding it. Rice that is transplanted when six weeks old into freshly cleaned land has, of course, a much better chance to keep ahead of the noxious grasses and weeds.

About 300 acres have been seeded in the manner described, and seed beds have been prepared for about as much more, to be transplanted according to the native method. Laborers for the work of transplanting have been scarce so far. To transplant an acre costs from $1 to $1.25 United States currency. Weeding rice seeded on the land in which it is to grow will cost nearly as much, and there is also some saving in seed by bedding and transplanting.

The greatest advantage is that by seeding and transplanting combined the season for preparing and planting may be lengthened by six weeks.

Worms have done some damage, but flooding as deeply as possible and a day or two of hot sun will kill all worms not reached by the water.

IRRIGATION.

The irrigation water is brought a long distance from the Tárlac River, and, owing to the fact that the temporary wing dam is often washed away, it requires much time and expense to keep a regular supply of water. The worst feature about this farm, outside of its poverty of soil, is that it is entirely too rolling for a rice farm. It requires too many dikes and cross dikes to keep water on the rice properly. The sandy soil of the dikes cuts, and caves, and it is impossible to keep up an even depth of water on the land, which is so necessary to keep down grass and weeds. So much trouble with watering is expensive, and so many dikes interfere with the work of the machinery.

IMPROVEMENTS.

A new blacksmith shop and a new grass-covered shed have been constructed, the latter on the western end of the farm for the isolation of working horses from those suffering with disease.

A railroad switch has been put in that adds greatly to the facilities of the farm.

LIVE STOCK.

Two visitations of surra have destroyed nearly all the horses and mules at this station, and without the plowing engine it would be impossible to produce a crop.

LABOR.

Labor is generally abundant at this place and under close supervision of foremen is fairly efficient. I would especially commend Mr. Stockton, who is assisting me in looking after this farm, for his energy and ability.

Several hundred visitors have been here to see our methods, and large orders have been placed for plowing engines, thrashers, hullers, and other machinery that the people have learned about here.

Very respectfully,

Z. K. MILLER,
Machinery Expert, In Charge of Rice Farm.

The CHIEF, BUREAU OF AGRICULTURE,
Manila.

EXHIBIT E.

LA CARLOTA, NEGROS OCCIDENTAL, *September 1, 1905.*

SIR: In compliance with your instructions of July 22, I have the honor herewith to render my report of the La Carlota experiment station under my charge for the year ended July 31, 1905.

DISEASES OF CANE.

I have had occasion to investigate some of the diseases of sugar cane in Negros during the past year, and have paid particular attention to the ant and fungi, also the grubworm, which destroy cane cuttings soon after they are planted. I have also studied methods of prevention. It was found that placing the cuttings in a solution composed of equal parts of bluestone and lime (5 pounds bluestone and 5 pounds lime to 50 gallons water) and allowing the same to remain therein for forty-eight hours gave the following results:

Of 200 cuttings thus experimented with, only one failed to grow, whereas the same number planted without first being soaked in the brine showed a loss of 23. It would appear, therefore, that this method is worth a trial by sugar growers.

CANE PLANTING.

Cane planting has been carried on at this station more economically than is the custom among the farmers of this region. It is the prevailing idea among the haciendero that cane must be set in the ground by hand and then stood at an angle of about 45° to insure growth. It takes 56 men six days to plant 10 acres of cane by this system. At this station it has been proven that this way of planting not only causes great loss in time, but is also very expensive.

Our planting was done as follows: We plowed the land well and gave it a good harrowing; then furrows were made rather deep—about 6 inches—which was done by running a plow through twice. I would advise their being at least 6 feet apart—perhaps 8 would be better—as it produces a sweeter cane than when planted in 4-foot rows, which is the custom among the sugar growers here. The furrows made, a native with a carabao and a load of cane cuttings passes along the furrow, dropping the cuttings in, regardless of how they drop or at what angle. Then the furrows were gone over with a harrow and the cane covered. In this way 12 natives can do as much planting as 50 by the other method. The cane so planted has shown excellent results.

Cane planted in this way should be soaked in brine, as above mentioned. Whole stalks have also been planted in this way and made good growth, but this would be too expensive to the sugar grower.

If there is no rain the crust on the soil should be kept broken, so that the capillary action of the soil will be destroyed and evaporation prevented of the moisture contained in the soil. A cultivator or harrow is the best implement with which to do this. About the time the cane is ripening it is well to keep the leaves stripped off, which will allow the cane to sweeten more readily.

The cane top is an object of great waste on the part of the haciendero. I have found the tops to be very useful, as they can be fed to stock, and they are relished by horses, mules, and carabaos. If heaped up in piles for feed they will keep for a long time. I use no other kind of grass during the sugar season, and if gathered and dried they can be used fairly well as dry feed for stock.

IRRIGATION.

Irrigation was carried on whenever water was available. Two irrigations were given plots 1, 2, and 3, and it was proven by various measurements taken that the irrigated cane grew much faster than that not irrigated. In one instance there was a difference in length of growth of 2 feet in favor of the irrigated cane. Water applied earlier in the season (May) made the root systems stronger and larger, and linear and diameter growth increased proportionately. At this time particularly cane needs to be pushed in order that it may have an opportunity to shade the land and kill off the grass that grows to such an extent when the first rains begin. It matters little how fertile a field may be, how perfect the condition of the soil as regards texture or tilth, or how congenial the temperature and abundant the sunshine, if at any time during the growth of cane a serious deficiency of soil moisture occurs there is certain to result a reduction in yield. Not all the rain that falls during the growing season is available for cane growing. Some of it is lost by surface and under drainage, and sometimes it falls in such small quantities at a time that it is practically retained on the surface and lost by direct evaporation before it has time to enter the soil. The amount of rainfall during the last six months was only 1½ inches. It will be seen that if the planters had been prepared and had irrigated their cane thousands of acres of cane would have been saved from the drought. The sugar crop for the year 1906 will undoubtedly be short.

NEW VARIETIES OF CANE.

The bureau of agriculture has imported several varieties, and it is found that the imported canes are apparently stronger growers and well adapted to the climate. This station has in the past year distributed 10,000 cuttings to planters, which will, it is hoped, add considerable to the sugar output of the island in a few years.

STOCK.

Twenty-eight Kentucky mares and 2 stallions were received at this farm for breeding purposes. Seven deaths, caused by glanders, and 1 birth have occurred. Twenty-two Kentucky and 8 native mares have been served by a Kentucky stallion. Two Kentucky mares have been served by a good native stallion. No results have been obtained as yet. The above animals, except the stallions, are being worked on the farm and are doing good work.

There are 20 carabaos at this place. Four births and 1 death (a young calf) occurred during the year. The carabaos have kept perfectly healthy.

HEMP AND FIBER PLANTS.

Hemp at this station has been almost a total failure. Of the 30,000 plants set out, more than half died during the drought. The following varieties received from Juan Araneta—Moro, Bisaya, Salawag, Camarines, and Kinisel—are good growers and have withstood the drought well. The 5,000 sisal bulbs which were received from the bureau of agriculture in November, 1904, are still in the nursery and look very promising.

SORGHUM.

This is well adapted to the climate on account of its drought-resisting properties. It is used more for its seed than for forage. Planting may be done any time during the dry season if there is moisture enough to germinate the seed. For green forage it should be cut before it gets more than 3 or 4 feet high. Horses do not like it so well as teosinte for green feed.

TEOSINTE.

This plant has given the greatest results as a forage crop, and during the rainy season can be cut three or four times. It should be cut when it has attained a height of about 3 feet.

VELVET BEANS.

The velvet bean has proved a good grower and a good grass killer. Furrows should be run in cogon or other grass about 5 to 6 feet apart and the beans put in 2 feet apart. This will make so strong a growth that all the grass between the rows will be choked out, and especially if beans are given one working to give them a start.

CACAO—COFFEE.

The cacao plants planted were nearly all killed off during the drought. Coffee plants stood it well, and some of the trees are now bearing fruit.

KAPOC OR COTTON TREE.

The cotton trees planted are doing well.

THE SHADE TREE (GAUAY-GAUAY. CATURAY).

Few trees equal, and probably none surpass, the gauay-gauay tree for street planting. Trials have shown it to be one of the most desirable trees for this purpose in Negros. There are several forms or types of this tree, the commonest being most like the soft maple in the United States. This tree is especially suited to avenue planting, as the trunk divides some distance above the ground into numerous branches, which gradually spread toward the top. As the tree grows older it becomes more or less arched. It is a rapid grower, resists drought well, and is hardy. The wood is too soft to be of great value for fuel. It is readily propagated by cuttings. This tree bears a beautiful flower, similar to the lily, which makes an excellent salad that is relished by the natives.

RAINFALL.

1904.	Inches.	1905.	Inches.
July	14.08	January	No rain.
August	17.01	February	.25
September	12.18	March	No rain.
October	14.06	April	No rain.
November	20.98	May	.25
December	1.51	June	1.00

Coldest day in the season, December 3, 1904, 66° F.; hottest day, May 12, 1905, 98° F. The following acreage has been planted:

	Acres.		Acres.
Sugar cane	200	Kaffir corn	10
Corn	10	Teosinte	20
Sorghum	10	Palay, on shares	150

Very respectfully,

JOHN HEIL, *Farm Superintendent.*

The CHIEF, BUREAU OF AGRICULTURE,
Manila.

EXHIBIT F.

GOVERNMENT STOCK FARM,
Baguio, Benguet, August 31, 1905.

SIR: In compliance with your directions of July 22, I have the honor herewith to submit a report of operations at this station:

By your orders dated Septemper 15, 1904, I proceeded to the government rice farm at Murcia, Tárlac, accompanied by J. J. Barnes, stud groom, and there put up temporary quarters for 4 stallions, 9 Kentucky mares, and 1 Arab filly. On or about October 8 I received instructions from you to proceed to Baguio, Benguet, for the purpose of establishing a permanent stock farm there. While at Baguio I received a telegram from the honorable the secretary of the interior to the effect that surra had broken out among the work stock at the rice farm and directing me to push forward with all haste the building of stables to receive stock, which would be shipped to Baguio at once.

Having looked over the country around Baguio and not being able to locate a permanent place on such short notice, I rented what is known as the Reavis place, 1 mile northeast of Baguio, consisting of a house and about 10 acres under fence, with a good spring about 50 yards from the house. The rent of this property was fixed at ₱25 per month, the bureau of agriculture to remove all stables and fencing when vacating the place.

A contract was given to the Benguet Commercial Company to build 1 stable to contain 4 box stalls, 10 by 10 feet; 10 open stalls, 10 by 9 feet, sides to be of boards and the roof of grass. This was put up with the idea of removing it as soon as a permanent place could be secured. The cost of this stable amounted to ₱1,620.

The stallions and mares arrived in Baguio about the 1st of October and were quartered in the sanitarium stables until the stables at Reavis place were finished. In the meantime, the blood of all the horses was subjected to daily microscopical examination in order to determine whether or not the animals were free from surra before being taken to the new stables. In ten days, being found free from disease, they were removed to our present location, and to this date no disease of any kind has made its appearance among them, with the exception of 1 mare, Harriet, which died of enteritis on March 27.

In February, 1905, I received from the disbursing officer at the sanitarium ₱1,000 for the purchase of pony mares to restock the civil sanitarium stables. These ponies were bought by me in Abra Province. They were intended for a double purpose—to be used by the guests at the sanitarium as saddle horses and to be bred to the Arab stallion—but it was found that mares and stallions could not be used together for the first-named purpose and consequently the mares were turned over to this bureau to be used as brood mares. There were 12 pony mares and 1 stallion in all purchased on this trip. When brought to Baguio they were put in quarantine for ten days and then taken to the farm, where I had a stable built for them at a cost of ₱960. It is 20 by 50 feet, with grass roof, board sides, double door at one end, single door at the other, and three large windows on the sides.

This stable at the present time accommodates 12 pony mares and 11 burros. In May, 1905, the civil sanitarium transferred to this bureau 11 cows, 1 yearling bull, and 9 calves, all in good condition. These cattle are turned out on the range during the day and driven up at night. I have about 10 acres fenced in, with a cow shed 20 by 30 feet, board sides and grass roof. It cost ₱35, not counting 700 feet of pine boards, which were transferred to this bureau by the bureau of architecture and used in constructing the sides of this shed. In this herd I have 1 Galloway bull. He came a little late, but I think about 50 per cent of the cows have been served by him.

This bull has served 8 cows belonging to the Kelly herd (Chino cattle), also 5 cows belonging to Igorrotes who live in the vicinity. There being quite a number of cattle in this vicinity, I agreed to let the natives have the services of the bull belonging to the bureau if they would allow me to castrate their bulls, which they gladly consented to. I have castrated

all the bulls in the neighborhood, so that I can now keep track of what I am doing in the cattle line. It is not practicable to stand a bull, as a stallion, when the cows are wild, and under those circumstances I think it best to let the bull run with the herd.

During the rainy reason we have about 1,500 acres of good grass land for horses and cattle. In the dry season, if the grass could be kept down by cutting, or heavy grazing, which is the better way, it would be hard to find a better country than this for stock. No disease has appeared as yet among the stock, and the ponies, cattle, and hogs look better in this province than in any I have seen.

Between Pacdal and Tublay there is a range of country which would make a fine cattle ranch. It would support over 1,000 head, there being plenty of water and not much timber.

BREEDING.

At the present time there are 3 stallions on the farm, 1 Kentucky saddle stallion, Montgomery Chief, jr.; 1 thoroughbred stallion, Handrail, and 1 Arab stallion; 8 Kentucky Denmark mares; 1 Arab filly, bred to native pony, not with foal; 1 Missouri mare bred to native pony, with foal.

Lillian D., sorrel mare, foaled April 18, filly by Dickens, he by Forrest Denmark; bred back to Montgomery Chief, jr., April 26, aborted, July 5; bred back, July 12.

Cricket, black mare, bred October 1, 1904; aborted May 18, 1905; bred back June 1.

Black Girl, bred March 18; with foal.

Cloudless, bay mare, bred July 2; doubtful.

Celerity, chestnut mare, bred to Director H.; with foal.

Snip, bay mare, bred to Arab Jan. 2.

Roberta, bay mare, black points; bred to native stallion May 10.

Lady Like, bay mare, bred to Thoughtful, Morgan stallion, October 3; with foal.

The above Kentucky mares are all registered in the American Saddle Horse Register. I have the number and breeding of all of the Kentucky mares belonging to this bureau.

Some of these mares have been bred right along up to the last of the season, which seems to be over up here about the last of June, date given of last service. I have bred 10 of the 11 pony mares to the Arab stallion. So far 6 are with foal, while some can not be determined as yet on account of having only recently been bred. Two mares have young foals by native stallions. Both foaled soon after arriving in Baguio. One pony mare died a few days after arriving, and also her foal, 6 days old. This was before the ponies were transferred to this station.

The burros are in good condition. They have 3 foals and more are expected soon. I am anxious to breed the jack to native mares and the Arab stallion to female burros and see what will be the result of the cross.

In May, 1905, by direction of the honorable the secretary of the interior, I had the large stable increased in size, to accommodate 10 more mares, which are to be sent to this station, 70 feet and roof 10 feet, full length of stable, making it in all, 200 by 20 feet, thus providing room for 4 stallions, 21 mares, and space for feed and bedding. Sawdust and dead grass are used for bedding. So far during rainy season all of the stock has done well. Dirt floors have been a success so far.

The American horses are fed twice a day. They are given about 6 pounds of oats, 6 pounds of hay, and about one-half sack of grass per day; grain is fed in the morning and hay and grass at night. Native horses are given about 4 pounds of oats per day and grass at night. The burros are fed the same ration as the ponies. The cattle are not fed when up; salt is given them every other day. Horses, ponies, and burros are all looked over every morning before being turned out; all cuts and wounds are attended to, feet are kept in shape, and when ticks are found a creoline bath is given. Not much trouble has been experienced with ticks since the grass was burned.

If we could raise our own feed, I don't think a better climate or a better grazing land could be asked for. The oats we got from La Trinidad experiment station (about 2 tons) was nothing more than oat straw, but I hope, as there is now water on the farm, that next year there will be a better crop. But it will be hard to keep oats in bundle from molding. I find it so with what we have on hand.

I strongly recommend that about 200 acres of what is now known as Baguio be fenced in for pasture. By so doing the rank grass will be kept down and in time the droppings and seed carried in that manner will make and keep the grass sweet and tender.

LIST OF STOCK AT THIS STATION.

Two Kentucky stallions, 1 Arab stallion, 8 Kentucky mares, 1 Missouri mare, 1 Arab filly, 1 colt, Kentucky mare; 12 pony mares, 2 pony colts, 10 female burros, 1 jack burro, 3 burro colts, 11 cows, 1 yearling bull, 9 calves, 1 native stallion (used for teasing).

I have entered all stock in herd register; Kentucky mares and stallions by name with full decsription; ponies and cattle by brand.

The employees at this station are, besides myself, 1 stud groom and 1 American negro, receiving ₱100 and ₱80 per month, respectively, and 3 Igorrotes at ₱15 per month each. I find Igorrotes quick to learn the management of American horses; they seem to take to our way very readily; but the Ilocano will never make a horseman.

I have bred about 20 outside native ponies and 1 Australian mare to the thoroughbred stallion. No more could be bred, as the natives seem to be afraid that it will kill their mares to give birth to foals. If those which have already been bred have no trouble foaling the number will be greatly increased next season, as there are about 200 good mares at La Trinidad. I hope next season to see them all bred to good stallions.

As soon as the natives begin to castrate the inferior stud colts and keep only the best, there will be a marked improvement in the breed. I have talked this matter over with some of them, and they are willing to try it.

Very respectfully,

H. L. CASEY,
Director of Studs.

The CHIEF OF THE BUREAU OF AGRICULTURE,
Manila.

EXHIBIT G.

LA TRINIDAD EXPERIMENT STATION,
Baguio, Benguet, August 16, 1905.

SIR: In compliance with your instructions of July 22, I have the honor to submit the following report of operations at La Trinidad station for the year ending August 31, 1905:

Owing to limited transportation facilities, some supplies much needed during the early portion of the year were delayed en route, so that we were very much handicapped in accomplishing the work desired at that time. These conditions have been met, however, and no serious difficulty along this line is anticipated in the future. We have also been disappointed with many of our plantings because of nongermination of seed. Doubtless this difficulty is due to climatic conditions being unfavorable to the preservation of seed vitality. Several attempts were made to photograph growing crops, as well as mature products, but each attempt resulted disastrously because of stale plates or breakage of plates while en route to Manila for development.

PERMANENT IMPROVEMENTS.

The former irrigation ditch proved inadequate for the increased area under cultivation. By the middle of the season this difficulty had been temporarily overcome, and recently a new and larger irrigation ditch has been constructed, reaching from the original intake to the station boundary line, and when its extension through the farm is completed the irrigation problem will have been solved. The house on the station being out of repair and inadequate in size, an addition 16 by 20 feet has been built, the old roof rethatched, and the whole properly finished and painted. This was somewhat expensive, as the lumber had to be transported a distance of about 4 miles on the shoulders of men. The barn has been enlarged and the roof raised, so that we now have tool rooms, stable, and wagon sheds, with forage lofts sufficient for present needs. At the beginning of the year two cogon shacks were constructed for the accommodation of the laborers employed at the station. A few months later one of these houses was destroyed by fire and has since been replaced by one more commodious and with better sanitation. A number of sod fences have been razed, thereby enlarging the fields for more advantageous cultivation, while line fences, road fences, and others that it seemed desirable to retain have been strengthened and made more secure by additions of turf and by placing one or two strands of barbed wire at the top. A number of rods of new fence have also been constructed and farm gates conveniently placed. The plots used in vegetable gardening have been more thoroughly graded and enlarged in such a way as to afford better facilities for irrigation and cultivation. August 30 finds the entire station under cultivation, all runo and cogon areas having been cleared and all sod fields broken. A considerable acreage was sown to oats at various periods during July and August. Several acres were sown to clover during the latter month, and land is being prepared for more extensive plantings of corn, teosinte, sorghum, the small grains and grasses, as well as potatoes and garden vegetables, especially peas. A continued succession of small plantings will also be maintained during the coming year.

SHRUBS AND TREES.

Several hundred plants of two varieties of native raspberries were recently gathered from the mountains and placed under cultivation in the hope that an improved strain may be developed adapted to local conditions. Several hundred native blueberry plants were also brought in and set for a like purpose. A limited number of native shrubs were also collected and planted for decorative purposes. Many of the grapevines brought from the United States have died, while those still living have made no growth worth mentioning, and give absolutely no promise of future development. Of the fruit trees imported from America, but three or four of the peach trees are living, and these after passing two years practically dormant are now giving some sign of increased vitality, and it is hoped that they may yet become acclimatized and give some return. A majority of the apple trees are still living, and during the last few months have given signs of renewed growth. The lemon and pomegranate trees are doing somewhat better, but their future is still problematical. A few of the mulberry and walnut trees are also alive, but no growth worth mentioning has been made.

VEGETABLES.

Successive plantings of vegetables were made at frequent intervals throughout the year for the purpose of ascertaining the times and seasons best adapted to the growing and maturing of horticultural products. Concerning the dissimilarity of seasons at this altitude as compared with the lowlands, a hint may be taken from the natives in rice culture: Rice is harvested here just at the time of rice setting at Tublay, only three hours distant by pony trail, the difference being that Tublay lies about 2,000 feet below La Trinidad.

String beans and peas do reasonably well planted in the latter part of September and October, when the heavy, beating rains are over and while there are yet sufficient warmth and moisture to induce reasonably rapid growth. The best results are obtained, however, by planting in February and irrigating until the light rains of the spring months begin. By this method the quickest growth is made and the most prolific yields obtained. Seeds planted late in November, December, and January do not germinate well, and, moreover, if germination takes place, the plant after attaining a height of 2 or 3 inches remains practically dormant for two or three months before making further growth, and even then remains somewhat stunted. Plantings made so as to mature during the most strenuous portions of the rainy season are generally destroyed by the elements, and seed planted during July and August either rot in the ground or the plants are so damaged while young as to become practically worthless.

What has been said of beans and peas is also true of vegetables in general, nearly all of which may be successfully raised by observing proper times and seasons.

Tomatoes were successfully grown during the past season, and no trouble was experienced in bringing them to full maturity and ripening them on the vine by providing them with a little shade during the last stages of development. This was accomplished by sticking a few stalks of green runo about the hills.

Cabbage usually does exceedingly well in season, but during the past year the worms did considerable damage.

So far all attempts to grow watermelons and muskmelons have failed, but it is hoped that unfavorable conditions may yet be overcome.

FIELD CROPS.

Indian corn has not been an unqualified success, the entire absence of hot nights, which seem so necessary to its best growth, being largely accountable for its indifferent development.

Potatoes have proven very satisfactory when planted in September and October or in February, March, and April, and even in the heart of the rainy reason absolute failures may be avoided by securing perfect drainage. Indeed, the same may be said of all root crops, such as radishes, turnips, beets, etc.

Teosinte has been of such a slow growth that as yet we have been able to grow but one crop a year, but by allowing sufficient time have grown 14 tons of green forage per acre.

I am not fully prepared yet to say what may be accomplished with oats. I may say, however, that as a green forage crop it is a perfect success, two and even three cuttings having been secured from a single seeding. We have also raised small quantities of oats, sown in April, which filled well, but maturing in the rainy season rotted before ripening. Oats sown at the beginning of the dry season and standing for a time without sufficient moisture made a good growth after water was supplied, but failed to fill properly. The conclusion is that if sown during the rainy season and brought to maturity early in the dry season oats will be found an easy and profitable crop.

Trials with wheat and barley seem to warrant the same conclusion with regard to their culture. We hope during the coming year to perfect experiments with the small grains, and will then be better able to decide definitely the desirability of growing them.

With regard to the domestic grasses, the possibilities as yet are largely speculative. We have not yet been able to make our tests thorough and complete, but small seedings of clover made recently are giving a good promise already, while alfalfa so far has not proven satisfactory. A few plants of scarlet clover, which were found growing where other seed had been sown, developed finely, and suggest its probable adaptability to this locality. Volunteer timothy, which came up where American hay had been fed, has also shown possibilities of vitality and growth.

HOGS.

Doubtless one of the most profitable industries connected with agriculture, hog raising, could be made a perfect success in this region, where intense heat is never experienced, provided some adequate substitute for corn could be grown successfully. Attempts along this line are being made, and another year may find the desired object attained.

COFFEE.

The former excellent reputation of Benguet coffee has aroused an interest in the possibilities of further development of the resources of the province along this line, and it is hoped that the investigations of the coming year may prove sufficiently satisfactory to open up a new and profitable field for the investment of American enterprise and capital.

SALES AND FUTURE PROSPECTS.

During the year the sale of garden vegetables from this station has increased more than 300 per cent over last year, and considerable quantities of forage have been furnished the government stock farm at Baguio. I am also pleased to report that with the entire station under cultivation and other schemes of improvement nearly completed, our force of laborers for the coming year will be considerably less than it has previously been, while contingent expenses will fall far below those of previous years.

I also have the assurance of the provincial authorities that work will be commenced in October on the wagon road to Baguio, and when that road shall be completed we will be able to secure the manure from both the stock farm and sanitarium stables for fertilizing purposes.

Very respectfully,

WILL JESSUP,
Superintendent.

The CHIEF OF THE BUREAU OF AGRICULTURE,
Manila.

EXHIBIT H.

SAN RAMÓN, ZAMBOANGA, *August 1, 1905.*

SIR: In compliance with your instructions of July 22, I have the honor herewith to render my report of the San Ramón farm, under my charge, for the year ending July 31, 1905.

San Ramón has suffered from an eight months' drought, beginning November 1, 1904, and lasting to June 30, 1905, with the exception of a few light showers in the latter part of June, and as a natural consequence the farm is in such a bad condition that it will take at least a year and a half before the cocoanut trees will give their full quota of nuts and the abacá trees be in a healthy condition.

COCOANUTS.

The amount of copra made is 735 picos. Of this amount 485 picos were sold, the average price obtained being ₱6.40 per picos. The remaining 250 picos are still on hand. We have planted 5,000 cocoanut trees. This makes a total of 18,631, and they are in excellent condition notwithstanding the drought, but the trees in bearing have been damaged to such an extent that the crop for next year will be very light.

ABACÁ.

The abacá trees, like the cocoanut palms, have suffered materially. The trees planted ten or twelve years ago show the effects of the drought more than those planted during the last three years. Whole fields have been killed, not only the trunk, but the plant itself, while

others which were plowed and cultivated according to modern methods, while the trunk was killed, still retain life in the plant, and since the rain they have sent forth new shoots, which are more vigorous than those recently planted. We have been able to plant 20,000 and have plowed and prepared the land. Heretofore we were planting cocoanuts 27 feet apart and planting our hemp between, 9 feet apart, but I find that this is not advisable, as the hemp grows more rapidly than the cocoanuts and causes a dense shade, and the result is the cocoanut grows tall and spindling and has not the body and roots to support it when the ground is thoroughly soaked. When high winds prevail they become top-heavy and bend, making it necessary to cut off the branches and straighten them up. In the future whenever abacá is planted between the cocoanuts I would advise that 2 rows only of abacá be planted between each 2 rows of cocoanuts when the cocoanuts are planted 27 feet apart. I feel sure that the growth of the cocoanuts will fully justify any loss which we may sustain in the former. I find it necessary to cultivate the hemp at all times when the weather will so permit. I have been careful that no grass or weeds of any kind be permitted to go to seed, but at the same time after each and every rain grass grows to such an extent that it is necessary to pass the cultivator. This is especially true with the *Moti-moti* (wild morning-glory), as it winds around the young plants and retards their growth. We have gathered and marketed this year 36,031 pounds of hemp, the average price per picul being ₱23.34, which is a very fair price considering that all the hemp produced in the last six months was of a very poor quality; that is to say, that some of it was matured, while a portion had to be cut before being matured in order to prevent an entire loss. This was discolored, and the fiber not having the tensile strength of the former, it was necessary to leave more lineti (or waste) than would be required if the hemp had been uniform.

LAND PLOWED.

We have plowed 103 acres, 59 of which were plowed three times in order that we might be able to destroy the cogon grass, which was effectually done. The remaining 44 acres were plowed but once and as yet have not been planted, but will be as soon as we have enough moisture to insure the growth of the plants.

LAND CLEARED.

One hundred and three acres of land have been cleared of all trees, grasses, stumps, etc. All trees were dug up with the roots and either hauled off or burned on the land. Up to 1898 all these lands were in sugar cane, but since that time they have been overrun with the growth of trees, shrubbery, and grasses. The trees are of a soft wood nature and are surface feeders, and unless they are dug up with the roots it is almost impossible to pass the plow or cultivator.

IRRIGATION.

The effect of irrigation on both cocoanuts and abacá is as yet unknown, but I am of the belief that it would pay well if it could be applied on the farm either by gravitation or pumps. Either one could be applied at a less cost than the loss from drought during the last year. All cocoanut trees near the streams have not been retarded in the least; those bearing are loaded with frult and the young trees have not only made good growth, but are in a healthy condition. The same may be said of the abacá.

STOCK.

I am glad to report that of the 25 Chinese bullocks sent to the farm 20 are alive and in the very best of condition. Four died from an unknown cause shortly after being received and one had a compound fracture of the shoulder, which necessitated his being destroyed. I find the bullocks far superior for cultivating, harrowing, plowing, hauling cocoanuts, hemp, etc., to the carabaos.

LABORERS.

Fully 60 per cent of the men employed at San Ramón are ex-convicts and all those brought here from other islands, especially from the Visayan group, are industrious and desirous of learning the American methods of tilling the soil, etc. As for the Moros, the Subano is not desirable, while the Yacan Moro is industrious, capable, and willing to be instructed.

WAGES PAID.

The laborers on plantations in and around Zamboanga receive both salary and food. The food consists principally of rice and dried fish, and they receive the same salary, including their board, as those at San Ramón, with but few exceptions. The field laborer receives

from 40 to 50 cents conant per day. Those who are able to cultivate, plow, and harrow, and husk cocoanuts receive 60 cents conant per day. One man who understands firing copra receives ₱18 per month, and the native capataz receives ₱35 per month.

FERTILIZATION.

From the best information which I can gather the farm has been cropped continuously since 1870, everything which could be grown being taken off and nothing returned to replace the material which the continuous cropping took away. I have experimented a little with the material from hemp stripping; also with the ashes from the cocoanut husk and shell. I find that this material when placed around the cocoanut trees will increase the yield very materially. For example, on Calle Weyler there is a row of cocoanut trees on either side of the street. Eighteen months ago the south side of the street was thoroughly plowed and harrowed and then treated to about 20 pounds of ashes and one load of manure to each tree. The trees on the north side of the street averaged 15 nuts to the cutting and those on the south side 30, which seems to demonstrate the advisability to both cultivate and fertilize the bearing trees.

PERMANENT IMPROVEMENTS.

There have been built for the use of the laborers 10 nipa houses, 14 by 16 feet. These are occupied by laborers with families, and I find that such laborers, who can be housed and cared for in time of sickness and distress, are by far the most desirable.

Very respectfully,

GEORGE M. HAVICE,
Superintendent.

The CHIEF OF THE BUREAU OF AGRICULTURE,
Manila.

EXHIBIT I.

MANILA, *September 1, 1905.*

SIR: In compliance with your instructions of July 22, I have the honor herewith to render my report of an experiment in growing Sumatra tobacco under shade, carried on by this bureau during the last season at Arayat, Pampanga.

One hectare of land along the river, in the vicinity of the town, was selected for the experiment. The land had remained uncultivated since 1898 and was thickly covered with cogon grass. After burning and cutting down the grass as much as possible the land was thrice gone over with the native plow. Part of the land, where the soil is a sandy loam, was thus put in a fair state of cultivation, but the rest, being clayey, remained in a rather hard and lumpy condition until about a week after the planting, when an American plow was secured and the land properly cultivated.

One acre of the land was devoted to growing Sumatra tobacco under shade, the remaining land to tobacco exposed. The tent was constructed according to the instructions given in Farmers' Bulletin No. 5 of this bureau.

Owing to delay in securing and preparing the land at Arayat, the seed bed had to be prepared in Manila.

The seed was sown on November 1, and on December 25 transplanting was begun. The young plants were carried from Manila with as much care as possible, but it is thought that they suffered some damage, owing to the unavoidable roughness of the trip.

In transplanting, a cup of water was given to each plant immediately after it was put in the ground, but the weather was so dry at this time that the young plants did not succeed in getting a good hold in the soil. The weather continued dry and it soon became evident that unless very soon irrigated, the plants would all die.

On January 22 a gasoline engine and pump were put on the field and the necessary arrangements for irrigating were made. Owing to disorders in the engine it was impossible to irrigate more than a very small portion of the field. A traction engine was then sent from Manila, and the first irrigation was given the field on February 12.

From the date of transplanting, December 25, to February 12 there was no rainfall, and the young plants were without water except what little could be furnished them by means of cans. Many of the plants succumbed from the effects of the drought and all were materially damaged.

About the time the first irrigation was given there appeared on a few plants in the shade a large number of lice—aphides—of the same color as the leaf of the plant.

Ten days after the time the lice were first noticed in the field it was observed that the number of plants infested with lice had considerably increased, and that the plants on which the lice had first appeared were beginning to wilt and had ceased growing.

The field was immediately sprayed with Paris green, but no beneficial effect from this chemical was noticed. The infested area had by this time increased to one-half of the field under cover, and the plants were rapidly dying. Spraying with a mixture of kerosene and water, containing 10 per cent of kerosene, was tried, but proved unsuccessful. The amount of kerosene in the mixture was increased to 15 per cent, but this was found to injure the plant and had to be discontinued.

Practically all of the field under cover was affected by this time and, as a last resort, Professor Lyon, of this bureau, advised "tobacco smoking" as the most practical remedy under the circumstances. A large number of fires of tobacco stems were built throughout the tent, producing a dense smoke which was confined in the tent as much as possible, the idea being to have the atmosphere in the tent so full of tobacco smoke that the lice could not live. It was fully four hours from the time the fires were started until the smoke had cleared sufficiently to permit entering the tent. Upon examination it was found that a great number of lice had been killed and had fallen off the plants onto the ground dead. The smoking was continued on three successive days, at the end of which time the field was entirely free of lice.

Unfortunately the smoking had been done too late for the majority of the plants to recover fully from the effects of the lice and resume their normal growth. The greater part of the plants had been permanently injured and never attained full development.

As a consequence the resulting crop was necessarily of an inferior order, but a sufficient quantity of very fine wrapper leaves was obtained to show what may be expected under more favorable conditions.

Very respectfully,

A. M. SÁNCHEZ.

The CHIEF OF THE BUREAU OF AGRICULTURE,
Manila.

EXHIBIT K.

SINGALONG EXPERIMENT STATION,
Manila, September 1, 1905.

SIR: I have the honor to submit herewith a report of the operations at this station for the year ended August 31, 1905.

In accordance with your instructions, I shall report only on the field crops experimented with, the work with fruits and vegetables being under the direction of the horticulturist of the bureau.

SUGAR CANE.

Experiments are now under way to test the value of different varieties of sugar cane, their hardiness, influence of deep plowing, value of irrigation, resistance to winds and storms, and their general desirable qualities. With these objects in view a plot of one-eighth of an acre was planted on January 12, 1905, to the following varieties: Demerara No. 74, White Bamboo, Tiboo Mird, Louisiana Striped, Striped Singapore, and the Filipino white native cane. Three-fourths of this plot of ground was broken 5 inches deep with an ordinary turn plow; the remainder was thoroughly spaded to a depth of 18 inches. Furrows 5 inches deep and 5 feet apart were then run through the whole plot and the cane planted by placing the pieces end to end in the furrows. The cane was covered to a depth of about 2 inches, and water was then run down the furrows until the soil surrounding was well saturated. Under these conditions germination was rapid, and in two weeks the cane was up to a good stand. The young cane was irrigated at intervals of two or three weeks through the dry season. While the beneficial influence of this irrigation has all along been very marked, its true value will best be indicated by the tonnage tests that will be made when the cane reaches maturity.

On May 19 of the present year, about the beginning of the rainy season, another plot of one-sixteenth of an acre was planted to Demerara No. 74, White Bamboo, and the native cane. The object of planting at this unusual season was to ascertain to what extent the present grinding season can be lengthened by irrigation. Under present conditions the grinding season in these islands, except in very favorable localities, begins about December 1 and ends about the last of March, all cane remaining in the fields after this date being so thoroughly dried out that it does not repay the cost of working. It is hoped that by

making plantings throughout the dry season and by proper irrigation the cane can be kept growing until the planter is ready to grind it, thus increasing the present grinding season of less than four months to at least six. The advantages of a long milling season are obvious. While nothing as to the result of the above experiments can as yet be announced with accuracy, it may be mentioned that Demerara No. 74 and White Bamboo at present show a cleaner, straighter growth than the other varieties, and indications of a considerably larger tonnage. Unfortunately the former has recently been attacked with a red rust that threatens to retard its growth seriously, whereas the White Bamboo, growing immediately beside it, is as yet unaffected. It is intended to secure chemical analyses of the different varieties when they reach maturity, and this, together with other data collected, will afford some index as to their relative values.

CORN.

Very satisfactory results have been obtained, both with pop corn and ordinary American field corn. The rapid growth of the latter has been especially remarkable, roasting ears being secured within two months from planting, and the crop mature enough to harvest within two and a half months. It will thus be seen that by irrigation it is possible to grow from three to four crops a year on the same land. Though no accurate measurements have been made, it is estimated that the average yield per acre is between 20 and 25 bushels. Three to four crops of corn a year on the same land is certainly very exhausting to the soil; but when we multiply the average yield per crop per acre by the three or four crops secured in a year, we have an exceptional yield, one that is seldom secured even in the corn-growing sections of the United States. Besides, the value per bushel here is certainly double that in the corn-growing sections of America. Under these conditions corn growing should be profitable, even though a considerable expenditure for fertilizers should be necessary. Then, during the wet season, a time rather unfavorable to the growth of corn, one of the land renovating crops, such as velvet beans, cowpeas, or peanuts, could be very successfully grown.

LEGUMINOUS FIELD CROPS.

Generally the attempts made to grow velvet beans, cow peas, and peanuts have been attended with marked success. The velvet bean, a crop largely grown in Florida as a stock feed and soil improver, has proven an especially vigorous grower. It has remarkable drought-resisting powers, while at the same time it thrives during the wet season on soils so poorly drained as to render them wholly unsuited to most other crops. In proof of this it may be stated that at the beginning of the last dry season a crop was planted and brought to maturity without irrigation, the vines covering the ground to a depth of 2 or 3 feet and choking out every vestige of the obnoxious grasses that are so troublesome in the Philippines. At the beginning of the present rainy season another crop was planted on land where, during the rainy season, the water level is seldom more than 6 inches below the surface, and more often less. Notwithstanding these conditions this crop at present shows a very luxuriant growth, the vines covering the ground to a depth of over 2 feet. The drought-resisting powers of the velvet bean peculiarly adapt it to the needs of the rice planter, he being able to grow it during the dry season—a time when, under present methods, his land is given up to grass and weeds. Besides improving the land, velvet beans furnish excellent grazing for animals. At present about 3 acres of this crop are growing at this station enough to supply quite a quantity of seed for distribution.

Cowpeas planted during the hot, dry season failed to do well despite irrigation, most of the vines dying, presumably on account of the intense heat. Those planted at the beginning of the rainy season have done extremely well, making a growth equal to that of the velvet bean. The small Spanish peanut has done well at all seasons, making a large crop of vines and an abundance of nuts. A plot of one-sixteenth of an acre gathered August 1 yielded at the rate of 70 bushels to the acre. There is no reason why this crop should not be more widely grown, as there are large areas of sandy lands in these islands well adapted to its culture. Besides, a yield of two or three crops a year should make its growth an interesting financial proposition.

Too few farmers, and especially those in the Philippines, realize the value of these leguminous crops as soil improvers. Dr. Stubbs, of the Louisiana Station, found that one acre of velvet beans and one acre of peanuts each furnished about 200 pounds of nitrogen to the soil, practically all of which was drawn from the air. These yields were rather high, however. One acre of cowpeas producing 2½ tons of dry matter, an average yield, will transfer from the air to the plants 100 pounds of nitrogen. This element is three times as valuable as either potash or phosphoric acid, and soils are especially apt to become deficient in it in this country, where conditions throughout the year are favorable to the rapid decay of organic matter.

The following from Bulletin No. 73, Arkansas Station, shows the relative values of peanuts, chufas (see below), and corn in pork production. In these experiments the pigs gathered the nuts themselves, being allowed access to only a part of the patch at a time, when these nuts were gathered being transferred to another part, and so on until all the nuts were gathered. It was found that one-twelfth of an acre of peanuts produced 104½ pounds pork in forty-six days; one-ninth of an acre of chufas produced 66 pounds pork in forty-six days; 7.6 bushels corn produced 112½ pounds pork in forty-six days.

The quantity of pork produced from one-fourth of an acre of each feed, estimating the yield of corn at 31 bushels per acre, was as follows: One-fourth of an acre peanuts, 313 pounds pork; one-fourth of an acre chufas, 148 pounds pork; one-fourth of an acre corn, 109 pounds pork.

It will be seen in this case that the value of an acre of peanuts in pork production was more than double that of an acre of chufas, and nearly three times that of an acre of corn. In these experiments the peanuts yielded at the rate of 90 and the chufas 184 bushels per acre. These high values of peanuts and chufas in pork production should warrant their much more general culture in these islands, especially when we consider the high price of pork in the Philippine markets. It should be mentioned that chufas are a carbohydrate food, and that the best results would possibly be obtained by feeding it in connection with peanuts or some other protein material.

FORAGE PLANTS.

Kafir corn, sorghum, teosinte, and milo maize continue to do well. Of these four Kafir corn seems best suited to the climatic conditions found here. It has powers of withstanding great extremes of both drought and flood. During the past year five crops were gotten from one planting, part of them during the dry season without irrigation. Sorghum and milo maize, though apparently not quite so hardy as Kafir corn, have proven very successful. Teosinte, while a good crop, has fallen far short of what has been predicted for it. It is not so hardy as either of three above-mentioned crops, and besides, seldom more than two crops have been obtained from one planting.

ROOT CROPS.

The Jerusalem artichoke has been grown very successfully, though some difficulty was experienced in saving the crop of seed. A crop of chufas is now coming to maturity. This is a crop that is largely grown in the Southern States as a hog feed. The yield at this station promises to come well up to the average secured in that section. In July one-sixteenth of an acre was planted to cassava, the camoting cahoy of the natives. The cuttings, which were taken from the middle of the old canes, were planted 3 feet apart in rows 4 feet wide. The plantings were made by thrusting the cuttings, which were about 1 foot long, vertically into the earth for about two-thirds of their length. This crop is now growing vigorously, and the rate of yield per acre will be ascertained when the crop is mature. Sweet potatoes have done well at all seasons.

FIBER PLANTS.

So far cotton has without exception been a total failure. Owing to the necessity for a dry season for its maturity, cotton should be planted only toward the end of the rainy season. Two plots were planted last fall, one in October to King's Improved, and the other in November to Sea Island. Both these made a splendid growth of stalk, but no sooner did they begin to fruit than they were attacked by an insect closely resembling the Texas boll weevil, both in general appearance and in the damage done. The result was that not enough seed were made to replace those that were planted. Paris green in various forms was tried without avail, it being next to impossible to poison the larva of the insect, which does its work inside the young fruit.

Plantings of abacá and maguey, or sisal hemp, have been made, but as yet are too young to announce any results. Quite a number of other fiber plants are being experimented with by Professor Lyon, the horticulturist of the bureau.

TRIALS WITH THE SISAL HEMP MACHINE.

In April of the present year this station received from Mexico a machine for extracting the fiber of the maguey or sisal hemp. The machine itself is not a complicated affair, being nothing more than the old "raspador," which has probably been used for twenty years in Yucatan for extracting the agave fibers. It is very simple, consisting of a heavy wheel 4 or 5 feet in diameter, and an adjustable curved wooden shoe about 3 feet long, which can be drawn up against the large wheel like the brake against a car wheel. To the circumference of this wheel are attached blunt brass knives at intervals of about 1 foot.

The leaf to be cleaned being admitted between the wooden shoe and the rapidly revolving wheel, the former is drawn up against the moving knives, which quickly scrape away the adhering pulp. The leaf is then reversed and the other end cleaned in a similar manner. The whole machine requires 2 men and a 2-horsepower engine for its operation.

WORK WITH MAGUEY.

On arrival it was found that the machine was very poorly constructed, the brass knives being of unequal lengths and the wooden shoe rough and not properly curved. Consequently considerable time was spent in getting the machine properly adjusted. Difficulty was also experienced in getting good maguey leaves to work on, those secured usually being in such a bad condition from their long journey as to render them unfit for a fair test. Finally quite a number of rather immature leaves were obtained from a place on the coast just south of the town of Parañaque. With these repeated trials were made, but the greatest speed attained in any of the trials was at the rate of about 75 pounds of dried fiber a day. The leaves cleaned yielded on an average only about 2 per cent of their weight in dried fiber. This is only about half of what is secured in Mexico, and was probably due to the immaturity of the leaves and to their having been cut during the rainy season. In view of this and the fact that the man feeding the leaves was inexperienced, it is believed that a yield of 125 or possibly 150 pounds of fiber may be secured per day. It is difficult to see how any machine fed by hand one leaf at a time can surpass these figures. After the machine was properly adjusted it did its work very nicely. Samples of the fiber have been sent to New York and London for prices.

WORK WITH ABACÁ.

In view of the much greater relative importance of this fiber and the urgent need of a machine that will properly clean it, a number of trials were made in cleaning abacá, both with the knife that is in common use and with the machine. With the abacá, as with the maguey, difficulty was experienced in getting stalks of the proper age and size, owing to the recent drought in the hemp districts. Most of the stalks received had also been cut about a week when they arrived here. This was another unfavorable factor, as the best results are obtained when the fiber is stripped within twenty-four hours after the stalk is cut. While these facts militated against both the quality and quantity of fiber, their influences were doubtless equally detrimental with the machine and with the knife; hence it is believed that the main objects sought, i. e., a fair comparison of the relative merits of the two methods, was attained. The following tables show representative results of the numerous trials made:

TABLE NO. 1.

Lot No.	Method.	Number of stalks.	Weight of stalks.	Average weight per stalk.	Time.	Weight of fiber.	Per cent of fiber.	Average estimated value by 3 leading exporting houses of Manila.
			Pounds.	*Pounds.*	*Min.*	*Lbs. ozs.*		
1	By hand	10	253	25.3	97	2 1	0.00815	₱22.75
2	By machine	10	265	26.5	36	4 5	.01627	22.25
3	Machine-cleaned waste from No. 1					1 6		21.375

TABLE NO. 2.

Lot No.	Method.	Number of stalks.	Weight of stalks.	Average weight per stalk.	Weight of fiber.	Per cent of fiber.	Average estimated value by 3 leading exporting houses of Manila.
			Pounds.	*Pounds.*	*Lbs. ozs.*		
4	By hand	5	174	34.8	2 4	0.0129	₱23.166+
5	By machine	5	173	34.6	4 4	.0245	22.25
6	Machine-cleaned waste from No. 4.				1 10		22.166+
7	By machine with brass shoe	5	100	20	2 12	.0275	22.333+

As will be seen from the tables, the hemp stalks averaged very small, and in Table No. 1 they were evidently immature, as is shown from the very low yield of fiber in both processes. This table shows the percentage of fiber obtained with the machine to be almost exactly double that obtained by the old hand-stripping process. Persons familiar with the latter will recall that the leaf is split tangentially; that is, the outer part is separated from the inner by passing a bolo or sharp piece of bone between them. The inner part of the leaf thus divided is always considered worthless by the native, as he can recover no fiber from it by pressing it under the knife. On pressing this material through the machine it yielded about two-thirds as much fiber as was gotten altogether from the old knife process. This and the breaking of a good many fibers in passing the leaf under the knife constitute the principal source of loss under the old method, and, as is seen from both tables, this loss averages almost 50 per cent. This loss must aggregate several million dollars annually, and has been going on ever since the hemp industry began. The figures in Table No. 2 practically bear out those of Table No. 1, the work in No. 2 being with somewhat larger and better matured stalks. Lot No. 7, Table 2, was passed through the machine after a brass-covered shoe had been substituted for the wooden one. The results show a higher percentage of fiber and a higher average value than any other lot. It will be seen that there is practically no difference in the average values of the lots cleaned by the different methods. While these results must not be accepted as conclusive, they certainly show what a heavy loss the hemp growers of these islands annually suffer, and it is believed they indicate the type of machine—with certain automatic feeding devices and improvements—that will eventually obviate this loss. It is intended to continue this work until all results are more fully verified.

LIVE STOCK

In May 9 Berkshire pigs arrived from the United States—3 boars and 6 sows. These sows have all been bred, and 1 now has a litter of 5 pigs. There is quite a demand for these pigs, and they will be supplied to persons in the provinces as fast as they become old enough. Many hog raisers in the vicinity of Manila utilize the services of our Berkshire boar in improving their breeds. A record of the sows bred is being kept. So far all American hogs here have remained perfectly free from disease and seem well adapted to the climate. Three imported breeds of poultry—brown leghorns, white leghorns, and buff cochins—have failed to do well, especially the last named. These breeds seem to do best in proportion to their resemblance to the native chicken. Thus the buff cochin, a large, heavily feathered breed, has been a complete failure, while the brown leghorn, which is not unlike the native chicken, has at times done very well. All except 6 of the chickens belonging to this station have been loaned to private parties, who are attempting to breed them.

No other animals are kept here, except 3 horses for farm work.

Very respectfully,

B. L. Moss,
Superintendent Singalong Experiment Station

The CHIEF OF THE BUREAU OF AGRICULTURE,
Manila.

INDEX.

ABACÁ. (See HEMP.)
AGLIPAY, BISHOP:
    Mentioned: 6.
AGRICULTURE:
    Use of modern farm machinery: 49, 50.
AGRICULTURE, BUREAU OF:
    Report of—
        Animals. (See LIVE STOCK.)
Batangas experiment station, plan to abolish: 429.
Batangas Province, cattle and carabaos, number of: 430.
Beef cattle, importations: 430.
Broom corn. (See CORN, BROOM.)
Brooms, manufacture of: 442.
Cacao—
    Growth of: 433.
    Importations: 433.
Cassava, test of: 433.
Cattle, raising of, inducements: 430.
Coffee—
    Growth of: 433.
    Importations of: 433.
Corn, broom, growth of: 442.
Corn, cultivation of: 436.
Cotton, growth of, experiments: 432.
Cowpea, growth of: 436.
Culion stock farm, plan to abandon: 429.
Dairy farm, condition of: 429, 430.
Expenditures: 429.
Experiment stations—
    Batangas—
        Report of: 451–453.
            Animals, importation of: 453.
            Beans, velvet and soja, cultivation of: 452.
            Cassava, growth: 452.
            Coffee, cultivation of: 453.
            Corn, cultivation of: 452.
            Fiber crops: 451.
                Cotton: 451.
                Sisal: 451.
            Forage crops, production of: 451.
                Kaffir corn: 451.
                Sorghum: 451.
                Teosinte: 451.
            Sugar cane, growth of: 452.
            Vegetables, growth of: 452.
    Carlota (La)—
        Report of: 455–458.
            Acreage planted: 458.
            Cultivation of—
                Cacao and coffee: 457.
                Sorghum: 457.
                Teosinte: 457.
                Velvet beans: 457.

AGRICULTURE, BUREAU OF—Continued.
Report of—Continued.
Experiment stations—Continued.
Carlota (La)—Continued.
Report of—Continued.
Hemp and fiber plants, growth of: 457.
Irrigation, result of: 456.
Live stock, number of: 457.
Rainfall: 457.
Shade trees, growth of: 457.
Sugar cane—
Disease of: 456.
Planting, method of: 456.
Rice farm (government)—
Report of: 453–455.
Improvements: 455.
Irrigation, difficulties of: 455.
Labor, abundance of: 455.
Live stock: 455.
Rice crop: 454.
Thrashing, method employed: 454.
Rice, cultivation of: 455.
Steam plowing: 454.
Cost of plowing: 454, 455.
Straw, production of: 454.
Price of: 454.
San Ramon farm—
Report of: 462–464.
Abacá, cultivation of: 462, 463.
Cocoanuts: 462.
Copra, price of: 462.
Fertilization, need of: 464.
Irrigation: 463.
Laborers, class of: 463.
Land cleared: 463.
Land plowed: 463.
Permanent improvements: 464.
Stock: 463.
Wages paid laborers: 463.
Singalong—
Report on operations at: 465–469.
Corn, growth of: 466.
Fiber plants, experiments: 467.
Forage plants, crops obtained from: 467.
Leguminous field crops, success of: 466, 467.
Live stock, condition of: 469.
Root crops: 467.
Sisal hemp machines, trials with: 467, 468.
Work with maguey, result of: 468.
Work with abacá, result of: 468, 469.
Sugar cane, cultivation of: 465, 466.
Stock farm (government)—
Report of: 458–460.
Accommodations: 458.
Breeding: 459.
Employees: 460.
List of stock: 459.
Location and conditions: 458.
Pasturage: 459.
Trinidad—
Report of: 460–462.
Coffee, cultivation of: 462.
Field crops, growth of: 461, 462.
Hog raising: 462.
Permanent improvements: 460.
Sales and future prospects: 462.
Shrubs and trees: 461.
Vegetables, cultivation of: 461.

AGRICULTURE, BUREAU OF—Continued.
Report of—Continued.
Fertilizers, use and cost of: 442.
Fiber investigations—
Report of: 443–446.
Abaca industry, improvements: 445, 446.
Abaca waste, use of for manufacture of paper: 444.
Bowstring hemp, production of: 445.
Cocoanut fiber, production of: 445.
Cotton, introduction of: 445.
Cotton tree, production of kapok, growth of: 445.
Fiber collections: 445.
Fiber-extracting machine for abaca: 443, 444.
Field investigations: 445.
Hemp, improvement in quality of fiber: 443.
Maguey, introduction of fiber-extracting machines: 444.
Ramie, production of: 445.
Sisal plants, importation of, from Hawaiian Islands: 444, 445.
Food stuffs, cost of: 436.
Government rice farm. (See RICE FARM, GOVERNMENT.)
Government stock farm. (See STOCK FARM, GOVERNMENT.)
Hemp—
Cleaning of: 431.
Cultivation of: 435.
Paper manufactured from waste: 431, 441.
Hemp (sisal)—
Growth of: 437.
Machine for cleaning: 437.
Price of: 437.
Soil, conditions for: 437.
Hemp-cleaning machines, operation of: 441.
Hogs—
Production of: 441, 442.
Selling price: 441.
Jute, growth of: 432.
Kapok (tree cotton)—
Experiments with: 431, 432.
Price of: 431.
Tests of: 431, 432.
Use of: 431, 432.
Value of: 431.
La Carlota Experiment Station, acreage of: 434.
Livestock—
Condition of: 434.
(See, also, ANIMALS.)
Milk, production of: 430.
Moro government, plan to transfer San Ramon farm to: 429.
Paper—
Manufacture of, from abaca waste: 431, 441.
Peanuts—
Cultivation of: 436.
Oil manufactured from: 436.
Personnel: 429.
Plowing, cost of: 433.
Plows, steam, operation of: 433.
Publications: 442.
Revenues: 429.
Rice, production of: 433, 434.
Rope—
Tests: 437–441.
Determination of elongation before rupture: 438.
Determination of weight: 438.
Methods employed: 438.
Purpose of: 438.
Results in detail: 438–440.
Tension tests: 438.
San Ramon farm, transfer of: 429.

AGRICULTURE, BUREAU OF—Continued.
Report of—Continued.
Seed and plant introduction, division of—
Report of: 446–450.
Distribution of: 446.
Introduction of new seeds: 447–448.
Artichokes: 447.
Chufas: 447.
Coffee, Liberian: 448.
Economic plants: 447.
Fruits: 447.
Lemons: 448.
Oranges: 448.
Pineapples: 448.
Strawberries: 447.
Tanias: 447.
Vegetable gardening and truck farming: 448–450.
Sisal hemp. (See HEMP.)
Sugar cane—
Cultivation of: 435, 436.
Production of: 434.
Sugar mill, operation of: 434.
Sugar mills, cost of: 436.
Sulphuric acid, manufacture of: 442.
Tobacco, cultivation of: 435.
Tobacco, Sumatra, report on cultivation at experiment station at Arayat, Pampanga: 464, 465.
Veterinary division transferred from board of health: 47.
AHERN, GEORGE P., Capt., Ninth U. S. Infantry, chief bureau of forestry:
Papers read by, on forest service in Philippines: 265.
Report of: 265–290.
Resolution authorizing detail with Philippine exhibit at St. Louis: 265.
ALGUÉ, REV. JOSÉ, director Philippine weather bureau:
Mentioned: 50, 51.
Report of: 391–416.
ALTEMUS, HILDA E.:
Mentioned: 5.
AMERICANS:
Influences of climate upon: 120–122.
AMŒBÆ:
Destruction of: 18.
Presence in cases of appendicitis: 18.
AMŒBIC DYSENTERY:
Committee to consider methods to combat: 105.
Recommendations of: 105.
Investigations: 351, 352.
Effect of various chemical substances: 352.
Prevalence of: 17, 18, 105.
Source of infection: 105.
Study and investigations of: 105.
ANGAT IRON REGION:
Iron industry: Report on: 315–328.
Blast furnace—
Cost of erection: 320.
Design of: 319.
Location of: 319.
Operation of: 319.
Cost of producing products: 315–318, 320, 321.
Daily labor: 316.
Mining: 316.
Smelting: 316.
Taxation: 316, 317.
Transportation: 316, 317.
Extension of industry, opportunities for: 319.
Pig iron
Amount, quality, and value of importations: 320, 321.
Production for calendar year: 318.
Value of: 318.

ANIMALS:
Diseased—
Destruction of: 77.
Legislation recommended concerning: 77, 78.
Regulations concerning: 77, 78.
Diseases of: 194, 195.
Importation of: 453.
Inspections in provinces: 196.
Serum treatment in provinces: 196.
(See also LIVE STOCK; STOCK FARM; CATTTE.)
ANIMAL INDUSTRY:
Burros, importation of: 45.
Dairy herd, growth of: 44.
Horses, breeding of: 45, 46.
Stock farm, establishment of: 46.
Work in: 44–46.
ANTS, WHITE (ANAY):
Methods employed for destruction of: 271.
Tests of woods treated with chemicals: 271.
APPENDICITIS:
Amœbæ as cause of: 18.
AQUARIUM:
Establishment of: 30.
ARAYAT, PAMPANGA:
Report on growing of Sumatra tobacco at: 464, 465.
ARCHITECTURE:
Types of: 177.
ARMY AND NAVY:
Assistance rendered quarantine service: 7, 14.
ARNELL, C. J , ACTING LIBRARIAN:
Report of: 340–348.
ASBESTOS:
Deposits of: 303.
ASCHER, ALFRED:
Mentioned: 259.
ASSOCIATIONS:
Number of mining claims held by: 27.
BAGUIO:
Beri-beri at: 20, 21.
Diseases at: 20.
Temperature and rainfall: 21.
Typhoid fever cases: 20, 21.
(See also SANITARIUM, CIVIL.)
BALANTIDIUM COLI INFECTIONS:
Investigations: 353.
BALSAMS:
Production of: 284.
BANISTER, Maj. J. M.:
Mentioned: 122.
BANKS, CHAS. S.:
Mentioned: 348, 354.
BATAKS OF PALAWAN:
Publication of: 55.
BATAN ISLAND:
Applications for surveys of coal claims: 385.
Coal deposits: 302, 312–314.
Narrative report of work: 312–314.
BATANGAS EXPERIMENT STATION:
Plan to abolish: 429.
Report of: 451–453.
Animals, importation of: 453.
Beans, velvet and soja, cultivation of: 452.
Cassava, growth: 452.
Coffee, cultivation of: 453.
Corn, cultivation of: 452.
Fiber crops: 451.
Cotton: 451.
Sisal: 451.

BATANGAS EXPERIMENT STATION—Continued.
Report of—Continued.
Forage crops, production of: 451.
Kaffir corn: 451.
Sorghum: 451.
Teosinte: 451.
Sugar cane, growth of: 452.
Vegetables, growth of: 452.
BATANGAS PROVINCE:
Cattle and carabaos, number of: 430.
Disposition of the dead: 112, 113.
BATHS:
Establishment of: 81.
BEANS:
Cultivation of: 452.
BEEF CATTLE:
Importations: 430.
BERI-BERI:
Cases of: 20.
Prevalence of: 106.
Treatment of: 106.
BIERBOWER, DR. H. C.:
Mentioned: 186.
BIGGAR, DR. J. H.:
Mentioned: 186.
BILIBID PRISON:
Cholera—
Action taken in cases: 6.
Deaths, number and causes: 149.
Medical department of—
Buildings: 96, 97.
Cases treated: 97.
Hospitals: 96.
Personnel: 96.
Sanitation, control of: 6.
Sanitary supervision over: 1.
BIOLOGICAL LABORATORY:
(See LABORATORIES, GOVERNMENT, BUREAU OF.)
BIRTHS:
Number of: 124.
Statistics: 107.
BLIND:
Care of: 99.
Report of persons living in various provinces: 157.
BLISS, CHAS. L:
Mentioned: 338.
BLOOD:
Examinations: 358.
BONTOC IGOROT:
Publication of: 55.
BOTANICAL WORK:
Investigations: 34.
BOTANIST:
Report of. 368–374.
Acknowledgments: 373, 374.
Exchange and distribution of duplicate botanical material: 370, 371.
Herbarium, growth of: 369.
Number of specimens in: 369, 370.
Identification of material, progress made in work of: 371.
Investigations and work for other bureaus: 372.
Personnel: 369.
Publications: 372, 373.
Recommendations: 373.
BOTOCAN FALLS:
Description of: 325.
Use of, for generating purposes: 326.
BREAS:
Production of: 284.

BRICK KILNS:
Location of: 327.
BRINCKERHOFF, DR. W. R.:
Mentioned: 32, 336, 348, 351.
BROOM CORN. (See CORN, BROOM.)
BROOMS:
Manufacture of: 442.
BROWN, REV. ROBERT:
Discoveries made by: 495.
BRYANT, RALPH C.:
Mentioned: 266.
BUBONIC PLAGUE:
Inoculations against: 165.
Prevalence of: 11.
Study of: 352.
Treatment of: 185.
BUILDINGS:
Approval of plans for: 175.
BULACAN IRON INDUSTRY:
Report on: 315–321.
(See ANGAT IRON REGION.)
BURIAL GROUNDS. (See CEMETERIES.)
BURIALS:
Funeral services: 112, 113.
Manner of conducting: 112–117.
Number of: 152.
BURNHAM, D. H.:
Mentioned: 82.
BURRITT, CHARLES H.:
Mentioned: 293, 305.
CABARRÚS, DR. JUAN:
Report of: 168.
CACAO:
Cultivation of: 457.
Growth of: 433.
Importations: 433.
CADWALLADER COMPANY, B. W.:
Sawmills of: 270.
CAINGIN:
Applications for permit to make: 279, 280.
CALAMIANES ISLANDS:
Inhabitants: 3.
Salt mines: 3.
CALIFORNIA-MANILA LUMBER COMPANY:
Contract for construction Cebu Quarantine Station: 234.
CAMIGUIN VOLCANO:
Investigation of: 4.
CANABOJO:
Paper made from: 34.
CARABAOS:
Inoculations against rinderpest: 199.
Serum treatment: 196.
CARGO:
Inspection of, by quarantine service: 14.
CARGOES:
Circular letters concerning: 226.
Inspection of: 215.
CARIDAD CEMETERY:
Condition of: 112.
CARLOTA (LA) EXPERIMENT STATION:
Report of: 455–458.
Acreage: 434.
Acreage planted: 458.
Cultivation of—
Cacao and coffee: 457.
Sorghum: 457.
Teosinte: 457.
Velvet beans: 457.

CARLOTA (LA) EXPERIMENT STATION—Continued.
Report of—Continued.
Hemp and fiber plants, growth of: 457.
Irrigation, result of: 456.
Live stock, number of: 457.
Rainfall: 457.
Shade trees, growth of: 457.
Sugar cane—
Disease of: 456.
Planting, method of: 456.
CARTER, DOCTOR:
Mentioned: 105.
CARTER, MAJ. E. C.:
Mentioned: 8, 193.
Recommendations of: 123.
Report of: 123.
Retirement of, as commissioner of public health: 4, 63.
Work accomplished by: 4.
CASE, MAJ. J. F.:
Mentioned: 81.
CASEY, DR. H. L.:
Appointment: 429.
Mentioned: 45, 259, 429, 434.
CASEY, H. L., Director of Studs:
Report of: 458–460.
CASSAVA:
Growth of: 452.
Test of: 433.
CASTAÑEDA, DR. FRANCISCO:
Report of: 168.
CATTLE:
Diseases of: 194, 195.
Government abattoir, condemned: 198.
Importation of: 194.
Inoculations against rinderpest: 199.
Raising of, inducements: 430.
Serum treatment, 196.
Slaughtered in Matadero: 198.
See also Animals; stock farm; live stock.
CAVANNA, DR. VICENTE:
Report of: 168.
CAVITE, PROVINCE OF:
Smallpox, eradication of: 10, 65.
CEBU PROVINCE:
Coal deposits: 303.
Analysis of: 303.
CEBU STATION:
Quarantine transactions at: 232–237.
Autopsies: 234.
Buildings and equipment: 220.
Cholera: 232.
Circular letters and inspection: 234, 235.
Disinfections: 233.
Examination of applicants for master's and engineer's licenses: 234, 235.
Fumigations: 233.
General conditions: 234.
Health conditions: 233.
Plague: 232.
Smallpox: 233.
Vaccinations: 233.
Statistics: 236, 237.
CEMENT:
Manufacture of: 300.
CEMETERIES:
Burials, number of: 152.
Caridad, condition of: 112.
Closing of: 111.

CEMETERIES—Continued.
Controversies relative to, settlement of: 111.
Disinterments: 152.
Draft of act regulating establishment and maintenance of: 113–118.
CHARCOAL:
Quantity taken from lands: 284, 285.
Revenue from: 288.
CHEMICAL LABORATORY:
(See LABORATORIES, GOVERNMENT, BUREAU OF.)
CHOLERA:
Appearance and spread of: 63, 64.
Assistance rendered by army: 7.
Assistance volunteered during the epidemic: 5.
Bilibid prison—
Conditions at: 6.
Cases detected and disposed of: 163, 164.
Combating, in provinces: 7, 64.
Complications: 7.
Declaration of freedom from: 161.
Educational campaign against: 6, 7, 64
Epidemics of: 103.
Hospital treatment: 5.
Immunity, studies of: 353, 354.
Lessons taught by epidemics: 103.
Manila, city of—
Number of daily cases: 5, 8, 64.
Protection to water supply: 7.
Measures for prevention: 103.
Methods employed to combat: 5.
Outbreak of: 216.
Quarantine, circular letters relative to: 223–226.
Reappearance of: 5.
Origin of: 5.
Reappearance in Manila: 161.
Report of: 158.
Serum for protective inoculation against: 33, 34.
Studies of: 353.
Treatment of: 5, 185.
CHOLERA VACCINE:
Preparation of: 367, 368.
CHRISTIE, EMERSON B., assistant ethnologist:
Mentioned: 421.
Report of visit to the Subanos: 424, 425.
Work of: 55.
CIRUJANOS MINISTRANTES:
Examinations for: 209.
CIVIL HOSPITAL:
Changes in organization: 1.
CIVIL SANITARIUM.
(See SANITARIUM, CIVIL.)
CLAY:
Deposits of: 327.
CLEARINGS:
(See FORESTRY, BUREAU OF.)
CLEGG, M. T.:
Mentioned: 351.
CLIMATE:
Health conditions under: 120–122.
Health of American civil-service employees: 120–122.
CLINICS:
Municipal, free services of: 98.
CLOSETS, PUBLIC:
Establishment of: 85.
CLOVER, Dr. A. M.:
Mentioned: 337.
Report of 358–361.

COAL:
Deposits of: 301–303, 312–314.
Analyses of: 301–303.
COAL LAND CLAIMS:
Period of development: 26.
COAL RESOURCES:
Extent of: 26.
COCOANUTS:
Cultivation of: 462.
Investigations: 359.
COCOANUT FIBER:
Production of: 445.
COFFEE:
Cultivation of: 452, 457, 462.
Growth of: 433.
Importations of: 433.
COGAN MINING COMPANY:
Claim of: 302.
COGON GRASS:
Growth of: 277.
Paper made from: 34.
Quantities obtainable: 3.
COLEGIO DE MEDICOS Y FARMACEUTICOS DE FILIPINAS:
Mentioned: 90.
COMMERCIAL MUSEUM. (See MUSEUMS.)
CONSTABULARY:
Medical service, provisions for: 96.
COOK, J. W.:
Mentioned: 429.
COPELAND, Dr. E. B.:
Mentioned: 369.
COPPER:
Deposits of: 298–300.
Investigations: 360.
COPRA:
Price paid for: 462.
CORBIN, MAJ. GEN. HENRY C.:
Mentioned: 219.
CORN:
Cultivation of: 436, 452.
Growth of: 466.
CORN, BROOM:
Growth of: 442.
CORPORATIONS:
Number of mining claims held by: 27.
CORRAL:
Report of services rendered by: 171.
COTTON:
Crops of: 451.
Growth of, experiments: 432.
Production of: 445.
COTTON TREE:
Production of kapok, growth of: 445.
(See also KAPOK.)
COWPEA:
Growth of: 436.
CREMATORIES:
Bodies received: 91.
Establishment of: 87.
Report of: 152.
CREMATORY:
Use of: 87.
CROP SERVICE. (See WEATHER BUREAU.)
CULION LEPER COLONY:
Sewer system: 181.
Survey of: 181.
Water supply, condition of: 181.
Work done at: 181.

CULION STOCK FARM:
Plan to abandon: 429.
DAIRY FARM:
Condition of: 429, 430.
DAIRY HERD:
Growth of 44.
DAMMAR, GUM COPAL:
Production of. 284.
DANFORD, CAROLINE L.:
Mentioned: 5.
DEAD:
Disposition of, proposed act to regulate: 113–118.
DEAD WAGON
Services of: 171.
DEATHS:
Accidents: 88.
Bilibid prison: 149.
Comparative statement: 125.
Number and causes of: 126.
Number of: 124, 125.
Race, sex, age, and cause· 131–148.
Rates: 107, 108.
Transients: 108.
Without medical attendance. 108.
DELL, H H..
Mentioned: 429.
DENTISTS:
Difficulties encountered by· 202, 203.
DENTAL COLLEGES:
Number of: 99.
DENTAL EXAMINERS, BOARD OF:
Candidates examined and registered. 12.
Report of: 201–203.
Board, members of. 201
Difficulties encountered by dentists: 202, 203.
Examinations 201, 202.
Meetings: 201, 202.
Work of: 99.
DENTISTS'
Chinese, practice of: 110.
Difficulties encountered by: 202, 203.
Industrial tax 99.
Number registered: 12.
DIPITHERIA ANTITOXIN:
Production of: 367.
DISEASES:
Nonquarantinable, encountered on vessels: 218.
(See SANITARIUM, CIVIL HOSPITALS.)
DISINFECTING SERVICE.
Report of: 171.
DISINFECTIONS:
Manner of conducting: 86.
Report of: 154.
DISINTERMENTS:
Number of: 152.
DISPENSARIES, FREE:
Prescriptions filled by. 150.
Services performed by: 98.
DISPENSARIES, MUNICIPAL..
Location of. 98.
Services rendered by· 169, 170
Work of. 98.
DOCUMENTS:
Journal, publication of. 32.
DONELAN, Dr JOSEPH:
Mentioned 92.

DOUD, WILL L.:
Mentioned: 85.
DRAINAGE:
Conditions and requirements: 176, 177
DRUGGISTS:
Chinese, practices of: 110.
DYE BARK:
Production of: 284.
Revenue from: 288.
DYER, G. L., Commander, U. S. Navy, governor of Guam::
Communications relative establishment of weather bureau stations 404–406, 407.
DYEWOOD:
Production of: 284.
Revenue from: 288.
DYSENTERY:
Cause of: 65.
EATON, VOLNEY:
Mentioned: 71.
EDWARDS, Dr. RALPH T.:
Mentioned: 336, 348.
EDWARDS, H. T., fiber expert:
Mentioned: 431.
Report of: 443–446.
ELECTRIC STREET CARS:
Operation of: 88.
EMPLOYEES:
Acclimation of: 121.
Climatic influences with reference to health: 120–122.
Health of: 120–122.
ENTOMOLOGY:
Laboratory work: 354.
Accession of insects: 356.
Cooperation: 356.
Research work: 354, 355.
ENTOMOLOGICAL WORK:
Investigations: 34, 35.
ERICSON ARTIFICIAL LIMB COMPANY:
Mentioned: 88.
ESTEROS:
Condition of: 84.
ETHNOLOGICAL COLLECTIONS:
Quarters for: 56.
ETHNOLOGICAL SURVEY:
Organization, changes in: 1, 2.
Publications of: 55, 56.
Report of: 417–427.
Acting chief, work of the: 418–421.
Chief, work of the: 417.
Commercial museum, report of: 425, 427.
Quarters for: 425, 426.
Work accomplished by: 422, 426, 427.
Museum of ethnology, quarters for: 422.
Natural history museum, quarters for: 422.
Publications: 421.
Tribes at St. Louis, return of: 422.
Visit to the Subanos, report of: 424, 425.
Work for the coming year: 423.
Work of: 53–55.
EVELAND, A. J., Geologist, Mining Bureau:
Mentioned: 292, 293, 294, 296, 297, 298, 301.
Narrative report of Benguet field work: 311-312.
EXCRETA:
Disposal of: 178.
Pail system 178.
Septic vaults: 178.

EXPECTORATING:
Ordinance against: 105.
FALES, DR. LOUIS H.:
Mentioned: 211.
FAUNTLEROY, J. D.:
Mentioned: 71.
FAUNTLEROY, J. D., sanitary engineer:
Report of: 174, 181.
FECES:
Examination of: 357.
FENIX, EUGENIO:
Mentioned: 369.
FERTILIZATION:
Necessity for: 464.
FERTILIZERS:
Use and cost of: 442.
FIBERS:
Collections of: 445.
FIBER INVESTIGATIONS:
Report of: 443–446.
Abacá industry, improvements: 445, 446.
Abacá waste, use of for manufacture of paper: 444.
Bowstring hemp, production of: 445.
Cocoanut fiber, production of: 445.
Cotton, introduction of: 445.
Cotton tree, production of kapok, growth of: 445.
Fiber collections: 445.
Fiber extracting machine for abacá: 443, 444.
Field investigations: 445.
Hemp, improvement in quality of fiber: 443.
Maguey, introduction of fiber-extracting machines: 444.
Ramie, production of: 445.
Sisal plants, importation of, from Hawaiian Islands: 444, 445.
FIELD CROPS:
Growth of: 461, 462.
FILARIAL DISEASE:
Investigations and examinations: 352.
FIREWOOD:
Quantity taken from lands: 284, 285.
Revenue from: 288
FISH AND FISHERIES:
Administrative control over: 2.
FISHERIES:
Condition of: 30.
Investigation and development of: 2.
FLETCHER, F. F., Commander, U. S. Navy:
Communications relative weather service: 407.
FOLKMAR, DANIEL:
Mentioned: 56.
FOOD AND DRINK:
Inspection of: 81.
FOOD STUFFS:
Cost of: 436.
FORAGE:
Crops of: 451.
FORAGE PLANTS:
Crops from: 467.
FORBES, W. CAMERON:
Mentioned: 219.
FOREST MAP:
Preparation of: 23.
FOREST PRODUCTS:
Manifesting of, transfer of work of: 23.
Use of, without license or charge: 22, 23.
(See also FORESTRY, BUREAU OF.)

FORESTRY, BUREAU OF:
Gratuitous licenses granted: 22.
Receipts: 22:
Report of: 265–290.
Caingin, application for permit to make: 279, 280.
Clearings—
Abandoned: 277.
Causes leading to: 276.
Damage done by: 276.
Natural reforesting of: 278.
Season of making: 277.
Clearings or forest openings: 276.
Exhibit of forest products at St. Louis: 265, 266.
List of awards granted: 266.
Expenditures: 288.
Fires on grass lands: 278.
Forest charges, collection of: 267.
Forest products, quantity taken: 284, 285.
Breas, resins, balsam, etc.: 284.
Charcoal: 284, 285.
Dammar, gum copal: 284.
Dyebark: 284.
Dyewood: 284.
Firewood: 284, 285.
Gutta-percha: 284.
Oils, panao, wood oil: 285.
Rattan: 285.
Stakes for fish corrals: 285.
Statement of government charges collected: 287, 288.
Tanbark: 284.
Timber: 284, 285.
Forest types: 273.
Forestry management, division of, work of: 271, 272.
General conditions: 276.
Inspection, division of: 267.
Investigations: 268, 269.
Results: 269.
Lamao Forest Reserve—
Negritos, residence on: 282.
Survey and map of: 281, 282.
Titles to land, adjudication of: 282.
Work on: 281–283.
Licenses, granting of: 274.
List of: 275.
Firewood: 275.
Gratuitous: 275.
Timber: 275.
Maps: 273.
Personnel: 266, 267.
Philippine woods received in market, list and quantity of: 287.
Photographs: 273.
Private woodlands, registration of: 267.
Public lands—
Character of land, certificates of: 280, 281.
Homesteads, applications for: 280.
Report on, blank forms for: 281.
Revenue. 287, 288.
Sawmills, establishment of: 270.
Seed and plant exchange list: 283, 284.
Stations, changes in: 267.
Timber, amount cut. 275.
Timber and lumber, importations: 289.
Freight rates: 289.
Timber cut, quantity and species: 285–287.
Timber licenses, form of report of the operations of: 272.
Timber testing laboratory, work of: 268.
White ants (anay), methods employed against: 271.

FORESTRY, BUREAU OF—Continued.
Report of—Continued.
Woods, construction, price of: 290.
Woods, native, value of: 289.
Prices and quotations, comparative: 290.
Timber cut: 22.
FORESTRY EXHIBIT AT ST. LOUIS:
Effect of: 23.
FORESTS. (See also TREES.)
FORT WILLIAM MCKINLEY:
Cholera at: 63.
FOX, CARROLL, Passed Asst. Surg., quarantine officer port of Cebu:
Report of: 232–237.
FREER, PAUL C., superintendent government laboratories:
Mentioned: 120.
Report of: 329–340.
FRIAR LANDS:
Administration of: 381.
Estates, name of: 381.
Leasing of: 41, 382.
Purchase price: 381.
Purchases: 380, 381.
Rents collected: 40, 41, 383.
Subdivision of: 384.
Surveys: 41, 383.
FUNERAL SERVICES:
Laws relative to: 112–118.
FUNERALS:
Draft of act regulating establishment and maintenance of: 113–118.
GABRIEL, Dr. PROCESO:
Report of: 168.
GALLAGHER, HUGH J., superintendent Batangas experimental station:
Mentioned: 432.
Report of: 451–453.
GARBAGE, REFUSE, AND DEAD ANIMALS:
Collection and disposal of: 85, 86.
GARDNER, ROLLAND:
Report of rope tests: 438–440.
GENERAL HOSPITAL:
(See HOSPITALS.)
GEOLOGY:
Explorations; difficulties encountered: 305.
Formation of: 121.
GIBSON, JOHN:
Sawmills of: 270.
GLANDERS:
Diagnosis of: 352.
Prevalence of: 195.
GOLD:
Deposits of: 299–302.
GOMEZ, Dr. MANUEL:
Mentioned: 71.
GOODMAN, MAURICE, field assistant, mining bureau:
Mentioned: 294, 296, 297, 298, 301.
Report on Bulacan iron industry: 315–321.
GOVERNMENT RICE FARM. (See RICE FARM, GOVERNMENT.)
GOVERNMENT STOCK FARM. (See STOCK FARM, GOVERNMENT.)
GRAPE VINES:
Investigation of varieties in Semerara Island: 3, 4.
GRAVES: Dr. HENRY S.:
Mentioned: 265.
GUAM: ISLAND OF:
Establishment of weather station on: 404–410.
GUERDRUM, GEORGE H.:
Mentioned: 383.
GUM MASTIC:
Revenue from: 288.

GUTTA-PERCHA:
Production of: 284.
Revenue from: 288.
GWYN, M. K., PASSED ASST. SURG.:
Mentioned: 238.
HABITATIONS:
Houses, construction of: 82.
HANLEY, THOMAS:
Mentioned: 282.
HARE, CHARLES B.:
Mentioned: 348, 352, 353.
HARRIS, JESSE R., assistant surgeon, U. S. Army:
Mentioned: 237.
HARTY, ARCHBISHOP:
Mentioned: 5, 6.
HAVICE, GEORGE M.:
Mentioned: 435.
HAVICE, GEORGE M., superintendent San Ramon farm:
Report of: 462–464.
HAYWARD, G. H.:
Mentioned: 312.
HEALTH:
Climatic influences upon: 120–122.
HEALTH, BOARD OF:
Clerical division –
Duties of: 71.
Dead, proposed act to regulate disposition of: 113–118.
Disbursing division –
Receipts of: 70.
Former organizations: 69.
Hospitals, division of—
Organization of: 73, 74.
Inspections, disinfections, and transportation, division of: 70.
Duties of: 70.
Launch, use of: 87.
Legislation recommended: 66.
Leper colony division—
Condition of work: 75.
Library of: 99.
Personnel, distribution of: 79.
Property division –
Duties of: 71.
Organization: 69, 70.
Property, value of: 71.
Reports of: 4, 63.
Sanitary engineering, division of—
Duties of: 71.
Statistical tables: 124–159.
Statistics and reports, division of—
Duties of: 71.
Vaccination, division of –
Work of: 71–73.
Vaccine virus distributed by: 154, 155.
Veterinary division –
Report of: 159.
Work of: 76.
HEALTH, BUREAU OF:
Organization, changes in: 1.
HEALTH DISTRICTS:
Establishment of, recommended: 78, 79.
Organization of: 70.
Organization and personnel: 180, 181.
Plan of organization: 78, 79.
HEALTH DIVISION, PROVINCIAL:
Organization of, abolition recommended: 78, 79.
Reorganization recommended: 78–80.
HEALTH INSPECTOR, CHIEF:
Report of: 160–173.

HEALTH, PROVINCIAL BOARDS OF:
Unsatisfactory condition of: 11.
HEALTH RESORTS:
Value of: 118.
HEIL, JOHN, superintendent La Carlota experiment station:
Mentioned: 434.
Report of: 455–458.
HEISER, Dr. VICTOR G., United States Public Health and Marine-Hospital Service:
Appointment as commissioner of public health: 4.
Mentioned: 8, 13.
Report of: 213–244.
HELM, J. M., commander, U. S. Navy:
Communications relative weather service: 411
HEMP:
Cleaning of: 431.
Cultivation of: 435, 462, 463.
Growth of: 457.
Improvement in quality of fiber: 443.
Paper manufactured from waste: 431, 441.
Waste, use of for manufacture of paper: 444.
HEMP-CLEANING MACHINES:
Operation of: 441.
Results of trials of: 468, 469.
Work accomplished by: 44, 437.
HEMP INDUSTRY:
Improvements: 445, 446.
HEMP, SISAL:
Cultivation of: 43.
Growth of: 437.
Machine for cleaning: 437.
Price of: 437.
Soil, conditions for: 437.
HERBARIUM:
Growth of: 369.
Number of specimens in: 369, 370.
HERRERA, Dr. FLORENTINO:
Report of: 167.
HERZOG, Dr. MAXIMILIAN:
Mentioned: 9, 102, 256, 348, 350, 352, 353.
HISTORY AND LAWS OF THE MOROS:
Publication of: 56.
HOG RAISING:
Profits in: 462.
HOGS:
Production of: 441, 442.
Selling price: 441.
HOMESTEADS:
Applications for, number of: 36, 37.
HORSES. (See ANIMAL INDUSTRY.)
HOSPITALS:
Insane--
Establishment of: 10.
Buildings needed: 16, 17.
Civil--
Amœbic dysentery, cases treated: 17, 18.
Buildings needed: 16, 17.
Conditions at: 16.
Establishment and work of: 90.
Malaria, cases treated: 18.
Medicines called for in the provinces: 18.
Patients admitted and treated, number of: 18.
Report of: 245–253.
Cases treated: 245–253.
Personnel: 247.
Prescriptions filled: 247.
Work accomplished: 247.
Surgical work performed, success of: 18.

HOSPITALS—Continued.
District—
Establishment of, points recommended: 95.
General—
Plans, specifications, and estimates for: 93.
Necessity for: 94.
Insane, at La Lomboy, establishment of: 96.
Provincial or district—
Equipment for: 95.
Needs of: 94, 95.
Plans and specifications for: 94.
Sampaloc—
Employees authorized: 75.
Opening of, for treatment of diseases of women: 74, 75.
Physician in charge, report of: 193, 194.
Equipment: 193.
Personnel: 193.
Work accomplished: 193.
Subsistence, cost of: 194.
Report of: 151.
San Juan de Dios—
Contract with city of Manila: 92.
Capacity: 92.
Establishment of: 91, 92.
Equipment: 92.
History of: 91, 92.
Management of: 91, 92.
Number of patients: 92.
San Lazaro—
Cholera, treatment of: 5.
Establishment and work of: 90.
Establishments composing: 73.
Improvements recommended: 73, 74.
Infectious-disease department, buildings for: 91.
Insane asylum, establishment of: 74, 75.
Insane department, number of patients: 90.
Leper department, number of patients: 90.
Morgue and crematory, bodies received: 91.
Physician in charge, report of: 182–186.
Bubonic-plague department: 185.
Cholera department: 185.
Contagious-disease department: 184.
Improvements and changes in buildings, equipment, etc.: 182.
Insane department: 183.
Leper department: 184.
Morgue and crematory: 186.
Patients, number of: 182.
Sick, report on: 182.
Smallpox department: 185.
Subsistence, cost of: 183.
Women's department: 183.
Report of: 151.
Steam-disinfecting department, work of: 91.
Women's department, removal of: 74, 75.
X-ray machine for, arrival of: 8.
St. Luke's
Cases treated: 93.
Establishment. 92.
St. Paul's
Conduct of. 93.
Establishment of: 93.
Women's department. (See HOSPITALS, SAMPALOC.)
HOUSES:
Condemnation and destruction of: 175, 179.
Construction of: 82.
Inspections of: 154.
Types, description of: 177, 178.

ICKIS, H. M., field assistant, mining bureau:
Report upon building stone near Manila: 321–328.
Mentioned: 292, 293, 296, 297, 298, 300, 302, 383, 384.
IGNEOUS ROCKS, DIVISION OF:
Aphanites: 295.
Glasses: 296.
Phanerites: 295.
ILOILO, PORT OF:
Quarantine transactions at: 230–232.
Autopsies: 230.
Disinfection: 230.
Fumigation: 230.
Leprosy: 230.
Sanitary condition: 230.
Smallpox: 230.
Statistics: 231, 232.
Vaccination: 230.
IMMIGRANTS:
Deportations: 221.
Diseases for which rejection is made: 101, 102.
Inspection of: 220, 221.
Number arrived: 101, 102.
Number rejected: 101.
Rejections: 221.
IMMIGRATION:
Laws governing: 101, 102.
IMMIGRATION SERVICE:
Condition of: 221.
INGALLS, O. L.:
Mentioned: 81.
INOCULATIONS:
Number of: 365.
INOCULATORS:
Number of: 196.
INSANE:
Treatment of: 183.
INTERISLAND SHIPPING:
Investigation of: 219, 220.
INTERIOR, DEPARTMENT OF:
Bureaus of: 1, 2.
Organization: 1.
Changes in: 1, 2.
INTERIOR, SECRETARY OF:
Report of: 1–62.
INTERNAL REVENUE, BUREAU OF:
Manifesting of forest products transferred to: 23.
INSANE:
Accommodations for: 64.
Care of: 98.
Report of persons living in various provinces: 157.
INSANE ASYLUM:
Establishment of: 75.
INSANE HOSPITAL:
Number of patients: 90.
(See HOSPITALS.)
INSPECTIONS:
Houses, premises, and vaults, number of: 154.
IRON ORES:
Deposits of: 299, 300.
Importation, amount, quality, and value of: 320, 321.
Analysis of: 300.
(See also ANGAT IRON REGION.)
IRRIGATION:
Result of: 463, 456.
Difficulties of: 455.
ISLANDS:
Unknown, investigations of: 3, 4.

JENKS, Dr. ALBERT E.:
Mentioned: 53, 55.
JESSUP, WILL, superintendent Trinidad experiment station:
Mentioned: 435.
Report of: 460–462.
JOBLIN, Dr. MILLER:
Mentioned: 70, 120.
JOHNSON, Dr. C. RADCLIFFE:
Mentioned: 92.
JOLO STATION:
Quarantine transactions at: 238, 239.
JOURNAL, SCIENTIFIC:
Publication of: 32.
JUTE:
Growth of: 432.
KAFFIR CORN:
Crops of: 451.
KAPOK (TREE COTTON):
Experiments with: 431, 432.
Price of: 431.
Production and use of: 42, 43.
Tests of: 431, 432.
Use of: 431, 432.
Value of: 42, 43, 431.
KEE, Dr. TEE HAN:
Mentioned: 109.
Report of: 168.
KELLERMAN, KARL F.:
Mentioned: 67.
KENNON, COL. L. W. V.:
Mentioned: 19, 312.
KITASATO, Dr.:
Mentioned: 361.
KUWANA, PROF. S. I.:
Mentioned: 354.
LABOR:
Conditions of: 455.
LABORERS:
Prices paid: 463.
LABORATORIES:
History and work accomplished by: 118–120.
Marine biological—
Establishment of, recommended: 29–31.
Usefulness of: 31.
LABORATORIES, GOVERNMENT, BUREAU OF:
Biological laboratory, work of: 33, 34.
Botanical work: 34.
Charges authorized for supplies furnished and work done: 35, 36.
Chemical laboratory, work of: 34.
Entomological work: 34, 35.
Journal, publication of: 32.
Library of, composition of: 31, 32.
Name changed to bureau of science: 29.
New buildings, completion of: 29.
Cost of: 29.
Organization, changes in: 1.
Report of: 329–377.
Apparatus, cost of: 329.
Biological laboratory—
Report of: 348–358.
Amœbic dysentery, investigations: 351, 352.
Effect of various chemical substances: 352.
Asiatic cholera, studies of: 353.
Balantidium coli infections, investigations: 353.
Bubonic plague, study of: 352.
Clinical laboratory examinations: 349.

LABORATORIES, GOVERNMENT, BUREAU OF—Continued.
Report of—Continued.
Biological laboratory—Continued.
Report of—Continued.
Entomology, laboratory work: 354.
Accessions of insects: 356.
Cooperation: 356.
Research work: 354, 355.
Filarial disease, investigations and examinations: 353.
Glanders, diagnosis of: 352.
Hygienic work: 350.
Laboratory—
Examinations: 356–358.
Blood: 358.
Feces: 357.
Sputum, for tubercle bacilli: 357.
Necropsies: 358.
Pathological work: 349, 350.
Personnel: 336, 348.
Research work: 351.
Routine work: 337, 338, 348.
Smallpox investigations: 351.
Tropical ulcer, studies of: 352.
Botanist—
Report of: 368–374.
Acknowledgments: 373, 374.
Exchange and distribution of duplicate botanical material: 370, 371.
Herbarium, growth of: 369.
Number of specimens in: 369, 370.
Indentification of material, progress made in work of: 371.
Investigations and work for other bureaus: 372.
Personnel: 369.
Publications: 372, 373.
Recommendations: 373.
Buildings—
Cost of: 329.
Formal opening of: 329.
Chemical laboratory—
Report of: 358–361.
Analyses made: 358, 359, 360, 361.
Investigations: 359, 360.
Cocoanuts: 359.
Copper: 360.
Oils: 360.
Paper, plants useful for manufacture of: 360.
Resins: 360.
Wood oils: 360.
Personnel: 337, 338.
Routine work: 337, 338, 358, 359.
Chief clerk—
Report of: 375–377.
Duties of: 375.
Financial statement: 375, 376.
Free work performed and supplies furnished: 376, 377.
Office force: 375.
Receipts for work performed and supplies sold: 376.
Statement of value of work performed free of charge: 377.
Clerical force: 340.
Engineer—
Report of: 374, 375.
Machinery, installation of: 375.
Cost of running plant: 375.
Engineering force: 339.
Librarian, report of: 340–348.
Books—
Purchases: 341.
Received: 340, 341.
Transfer of: 340, 341.

LABORATORIES, GOVERNMENT, BUREAU OF—Continued.
Report of—Continued.
Librarian, report of—Continued.
Exchanges: 343, 344.
Gifts of publications: 344, 345.
Periodicals and books ordered and received: 341, 342.
Publications of bureau of government laboratories: 346, 347.
Bulletins printed and distributed: 347, 348.
Routine work: 345.
Subscription list: 343.
Use of library: 345, 346.
Libraries, union of: 335.
Marine biological laboratory, plan of work of: 332, 333.
Estimated cost: 333.
Mechanical plant, operation of: 339, 340.
Medical school, establishment of: 334, 335.
Personnel: 331.
Scientific journal, publication of: 335, 336.
Serum laboratory—
Report of: 361–368.
Antiplague serum, production of: 367, 368.
Antirinderpest serum, production of: 363.
Cost of preparing: 366.
Value of: 366.
Calves, number purchased, exchanged, sold, and died: 365.
Number vaccinated and amount of pulp collected from: 366.
Cattle purchased, exchanged, sold, and died in producing virulent blood: 364.
Cholera vaccine, preparation of: 367, 368.
Diphtheria antitoxin, production of: 367.
Improvements: 362.
Inoculations, number of: 365.
Mallein, preparation of: 368.
Routine work: 338, 339, 361–363.
Serum, amount prepared, issued, and used: 364.
Surra, prevalence of: 363.
Vaccine virus, production of: 365.
Amount prepared, issued, destroyed, and used: 366.
Cost of preparing: 367.
Value: 367.
Work of: 338, 339.
Standardization, weighing and measuring, regulations: 337.
Usefulness of: 330–335.
Work of: 330–337.
Scientific guests: 32
Scientific library for: 31, 32.
Serum laboratory, work of: 35.
Superintendent, work of: 29.
Value of work performed free of charge: 35, 36.
Work of: 31.
LA CARLOTA EXPERIMENT STATION:
(See CARLOTA (LA)).
LAMAO FOREST RESERVE:
Negritos, residence on: 282.
Survey and map of: 281, 282.
Titles to land, adjudication of: 282.
Work on: 281–283.
LANDS:
Acres under cultivation: 39.
Forest, acreage of: 39.
Title, mining claims, settlement of disputes: 305, 306.
LANDS, PUBLIC:
Applications for: 379, 380.
Coal claims: 380.
Free patent: 380.
Homesteads: 280, 380.
Lease of: 37.
Mining claims: 380.

LANDS, PUBLIC—Continued.
Applications for—Continued.
Purchase of: 37.
Sales: 380.
Character of land, certificates of: 280, 281.
Ignorance of people relative to laws concerning: 37, 38.
Land sites, application of law relative to: 38.
Legislation relative to, recommendations: 38–40.
Naturalization necessary for taking up: 42.
Reports, blank forms for: 281.
Restrictions imposed as to amount of land purchased, objections to: 37–40.
Surveys of: 41, 42.
LANDS, PUBLIC, BUREAU OF:
(See PUBLIC LANDS, BUREAU OF.)
LAUNDRIES, PUBLIC:
Establishment of: 81.
LAUNCH:
Use of, by board of health: 87.
LEGUMINOUS FIELD CROPS:
Success of: 466, 467.
LEPER COLONY:
Accommodations: 11.
Appropriations for: 75.
Cost of: 75.
Completion of: 11, 75.
Nonleprous personnel: 75.
Progress of work on: 75.
LEPERS:
Disposition of: 74.
Distribution of: 104.
Isolation of: 103, 104.
Number in San Lazaro Hospital: 90.
Number of: 103, 104.
Report of number in various provinces: 156.
Treatment of: 184.
LEPROSY:
Cases detected and disposed of: 163, 164.
Cases detected on vessels by quarantine service: 15.
Cases reported: 218.
Cases treated by X ray: 9, 64.
Result of: 9, 10, 64.
Observations, with an account of its treatment with the X ray: 186–193.
Prevalence of: 103, 104.
Treatment by X ray: 8–10, 64, 186–193.
Type of: 103.
LEWIS, DR. GILBERT N.:
Mentioned: 338.
LEWIS, W. F., acting assistant surgeon:
Mentioned: 238.
LICENSES:
Action taken of: 153.
Applications acted upon: 171.
Granting of: 274.
List of: 275.
Firewood: 275.
Gratuitous: 275.
Timber: 275.
Timber, gratuitous, amount of timber cut under: 22.
LIMBS, ARTIFICIAL:
Sale of: 88.
LIMESTONE:
Analysis of: 300.
Cement made from: 300.
Deposits of: 328, 300.
LIVE STOCK:
Condition of: 469, 434.
Number of: 457.
(See also ANIMALS.)

LONG JOHN D., passed assistant surgeon, U. S. Navy:
Mentioned: 63, 216.
LOUISIANA PURCHASE EXPOSITION:
Exhibit of Philippine forest products: 265, 266.
LOWLANDS:
Filling in of: 86.
LUMBER:
Freight rates: 289.
Importations: 289.
(See also FORESTRY, BUREAU OF.)
LYON, WM. S., horticulturist:
Mentioned: 432.
Report of: 443–446.
MACHINERY (FARM):
Use of modern machinery: 49, 50.
MAGUEY:
Cultivation of: 43.
MALARIA:
Cases treated: 18.
MALARIAL DISEASES:
Prevalence of: 106.
Treatment of: 106.
MALLEIN:
Preparation of: 368.
MALLORY, WILLIAM J., attending physician and surgeon, civil sanitarium:
Appointment, in charge civil sanitarium, Baguio: 21.
Mentioned: 20, 258.
Report of: 255–264.
MANGANESE:
Deposits of: 303.
MANILA, CITY OF:
Beautifying of: 82.
Births, number of: 124.
Cholera—
Number of cases: 8, 64.
Number of daily cases: 5.
Report of: 158.
Reappearance of: 5, 161.
Crematory—
Cases received: 91.
Establishment of: 87.
Death rates: 107, 108.
Deaths—
Comparative statement: 125.
From accidents, number of: 88.
Number of: 124, 125.
Number and causes of: 126–130.
Race, sex, age, and cause: 131–148.
Disinfections: 86.
Dispensaries. (See DISPENSARIES.)
Electric street cars, operation of: 88.
Esteros, condition of: 84, 85.
Garbage, refuse, and dead animals, collection and disposal of: 85, 86.
Health districts, population of: 170.
Lowlands, filling in of: 86.
Markets—
Condition of: 83, 84.
Receipts and expenditures: 84.
Medical inspectors –
Report of work accomplished: 172.
Morgue -
Bodies received: 91.
Establishment of: 87.
Mosquito marshes, filling in of: 86.
Mosquitoes –
Campaign against: 12.
Night soil, collection and disposal of: 85.

MANILA, CITY OF—Continued.
Paupers, burial of: 87.
Police—
Medical service: 97.
Number of: 97.
Population by nationalities: 124.
Prostitutes: report of inspections: 171.
Physicians, municipal—
Duties of: 97.
Observatory. (See WEATHER BUREAU.)
Occupations, offensive and unwholesome, regulations: 83.
Opium smoking establishments, number and regulations for: 86, 87.
Pail conservancy system, working of: 85.
Public closets, establishment of: 85.
River and harbor population: 83.
Sanitary conditions, improvement of: 11, 12.
Sanitary improvements: 82.
Sanitary supervision of: 160, 161.
Sanitation—
Inspections: 80.
Sawmills, number and operation of: 270.
Schools, inspection of: 86.
Slaughterhouses—
Condition of: 83, 84.
Regulations for: 84.
Smallpox and plague reports: 155.
Smallpox, number of cases: 10.
Street cleaning: 84.
Streets—
Widening of: 82.
Vaccinations—
Number of: 10, 73, 164.
Report of: 155.
Water supply—
Protection against cholera: 7.
Recommendations relative to prevention of contamination: 66, 67.
Treatment by copper sulphate: 67.
Watershed, removal recommended: 67.
MANILA, PORT OF:
Quarantine transactions at: 227–229.
MANILA SAWMILL:
Capacity of: 270.
MAPS:
Forestry, preparation of: 273.
Mineral resources: 297, 298.
MARINE BIOLOGICAL LABORATORY:
Estimated cost of: 333.
Plan of work: 332, 333.
(See LABORATORIES, GOVERNMENT, BUREAU OF.)
MARIVELES STATION:
Patients treated at: 227.
MARKETS:
Receipts and expenditures: 84.
Sanitary condition of: 83, 84.
MARRIAGES:
Age of consent: 106.
Divorces: 107.
Statistics: 106.
MARSHALL, DR. THOMAS R.:
Mentioned: 71, 73.
MATA, Rev. MIGUEL SADERRA, acting director Philippine weather bureau:
Mentioned: 50, 51.
Report of: 416.
MATADERO:
Receipts and expenditures: 84.
McCASKEY, H. D., chief of the mining bureau:
Report of: 291–310.

McCollough, M. L.:
Proposed new system of crop reporting: 411–416
McCoy, George W.:
Report of: 230–232.
McCoy, H. B.:
Mentioned: 219.
McDill, Dr. J. R.:
Mentioned: 22, 352.
McMullen, Dr. R. H.:
Mentioned: 195.
McVeigh, F. L.:
Mentioned: 429.
Medical college:
Draft of act making provisions for establishment of: 65, 66.
Establishment of: 100, 334, 335.
Necessity of: 12, 13, 65, 100, 101.
Medical colleges:
Number of: 99.
Medical examiners, board of:
Candidates examined and registered: 12.
Report of: 207–212.
Certificates of registration—
Forms of: 207.
Requirements: 207.
Cirujanos ministrantes, examinations for: 209.
Examinations: 207–209.
Meetings: 207.
Midwives, number of: 210.
Organization: 207.
Physicians, needs of: 210, 211.
Number of: 210.
Number of, by provinces: 210.
Receipts and disbursements: 212.
Registrations, number of: 207.
Work of: 99.
Medical inspectors:
Work accomplished by: 172, 173.
Medical organizations:
Addresses delivered at meetings of: 89.
Meetings of: 88–90.
Medical practitioners. (See Physicians.)
Medicines:
Calls for in provinces: 18.
Chinese —
History of: 109, 110.
Practice of: 109, 110.
Treatment by Chinese: 109, 110.
Mehan, J. C.:
Mentioned: 85.
Mercado, Dr. E.:
Mentioned: 90.
Mercado, Dr. Rizal:
Mentioned: 187.
Mercury:
Deposits of: 303.
Merrill Elmer D., botanist:
Report of: 368–374.
Mey de, Dr. C. F.:
Mentioned: 75.
Mickle, Miss R.:
Mentioned: 187.
Midwife, District:
Report of: 170.
Midwives:
Number registered: 12.
Number of: 207.
Midwives, municipal:
Work of: 98.

MILK:
Production of: 430.
MILLER, DR. E. L.:
Work of: 53, 54, 55.
MILLER, LIEUT. E. Y.:
Mentioned: 55.
MILLER, DR. MERTON L., acting chief ethnological survey:
Report of: 417–424.
MILLER, Z. K., in charge of rice farm:
Mentioned: 429, 433.
Report of: 453–455.
MINERALOGICAL COLLECTION:
Quarters for: 1, 2.
MINERAL RESOURCES: 298, 304.
Mining and mineral resources: 298, 304.
Asbestos: 303.
Coal: 301, 302, 303, 312–314.
Analysis of: 301, 302, 303.
Copper: 298, 299, 300.
Gold: 299, 300, 301, 302.
Hematite and magnetite iron ores: 299, 300.
Analysis, result of: 300.
Limestone, result of analysis: 300.
Cement manufactured from: 300.
Manganese: 303.
Mercury: 303.
Petroleum: 301.
Tin: 303.
Progress made in development: 28.
MINERALS. (See MINING BUREAU.)
MINERAL WATER:
Analysis of: 324, 325.
Investigations: 118.
MINERVA II (Sailing vessel):
Beri-beri on board of: 15.
MINING:
Coal lands period for development: 28.
Cost of: 303, 304.
MINING BUREAU:
Organization, changes in: 1, 2.
Mineralogical collection, quarters for: 1, 2.
Report of: 291–328.
Angat iron region—
Iron industry: Report on: 315–328.
Blast furnace:
Cost of erection: 320.
Design of: 319.
Location of: 319.
Operation of: 319.
Cost of producing products: 315–318, 320, 321.
Daily labor: 316.
Mining: 316.
Smelting: 316.
Taxation: 316, 317.
Transportation: 316, 317.
Extension of industry, opportunities for: 319.
Pig iron—
Amount, quality, and value of importations: 320, 321.
Production for calendar year: 318.
Value of: 318.
Batan Island:
Coal deposits: 312–314.
Narrative report of work in: 312–314.
Benguet field work, narrative report: 311, 312.
Bulacan iron industry—
Report on: 315–321.

MINING BUREAU—Continued.
Report of—Continued.
Field work: 292, 296, 297.
Finances of the bureau: 310.
Future needs: 310.
Geological exploration, difficulties encountered: 305.
Igneous rocks, division of—
Aphanites: 295.
Glasses: 296.
Phanerites: 295.
Labor, cost of: 303, 304.
Library, transfer of: 293.
Maps: 297, 298.
Mining and mineral resources: 298, 304.
Asbestos: 303.
Coal: 301, 302, 303, 312–314.
Analysis of: 301, 302, 303.
Copper: 298, 299, 300.
Gold: 299, 300, 301, 302.
Hematite and magnetite iron ores: 299, 300.
Analysis, result of: 300.
Limestone, result of analysis: 300.
Cement manufactured from: 300.
Manganese: 303.
Mercury: 303.
Petroleum: 301.
Tin: 303.
Mining law, need of modification: 304–308.
Drawbacks to development of industries: 304–308.
Mining laws—
Legislative defects—
Assessment work: 309.
Dredging claims in navigable and tidal waters: 309.
Views of Philippine mining men: 309.
Museum work, collections: 293.
Office work: 292, 293.
Organization: 291.
Recommendations: 291, 292.
Petrographic, blowpipe, and paleontologic work: 294, 295.
Quarters: 292.
Recommendations: 310.
Stone, building—
Report on, found near Manila: In provinces of Laguna and Rizal: 321–327.
Bath house built by Spanish Government: 324.
Spring supplying: Waters of Bombongan, Pagsanjan, Laguna: 324, 325.
Description of: 324, 325.
Springs, volume of water: 324.
Topography and geology: 324.
Water—
Analysis, result of: 324, 325.
Physico-chemical characteristics: 324.
Physiological effects: 325.
Therapeutical indications: 325.
Botocan Falls—
Description of: 325.
Use of, for generating purposes: 326.
Brick kilns, location of: 327.
Clay, deposits of: 327.
Itinerary of trip of inspection: 322.
Limestone, red, deposits of: 328.
Method of working: 325.
Notes: 322–328.
Pagsanjan River and Falls, description of: 326.
Stones, price of: 328.
Surveys: 297, 298.
Title to lands, settlement of disputes: 305, 306.
Transportation facilities: 303.

PHARMACISTS:
Industrial tax: 99.
Number registered: 12.
PHILIPPINE CIVIL HOSPITAL. (See HOSPITALS.)
PHILIPPINE LUMBER AND DEVELOPMENT COMPANY:
Sawmills of: 270.
PHILIPPINE MINING COMPANY:
Application for surveys, mining claims: 384.
PHYSICIANS:
Illegal medical practitioners: 109.
Industrial tax: 99.
Need of: 12, 65, 210, 211.
Number of: 100, 210.
Number of, in provinces: 210.
Number of, ratio to population: 12.
Number registered: 12.
Percentage of, to population: 100.
Scarcity of: 100, 101.
PHYSICIANS, MUNICIPAL:
Duties of: 97.
Number of sick and wounded attended by: 150.
Reports of: 167, 168.
PINCHOT, GIFFORD:
Mentioned: 265.
PLAGUE:
Cases detected and disposed of: 163, 164.
Cases reported: 216, 217.
Prevalence of: 216, 217.
Cases, number of: 102, 103.
Measures for prevention: 102, 103.
Number of cases of: 15.
Prevalence of: 102, 103.
Quarantine, circular letters relative to: 225.
Rats, destruction of: 102, 103.
Report on: 155, 156.
PLOWING:
Cost of: 433.
Cost of, by steam: 454, 455.
PLOWS, STEAM:
Operation of: 433.
Purchase of, recommended: 50.
PLUMBING:
Regulations concerning: 81, 82.
POLICE:
Medical service: 97.
Number of: 97.
POLK, MARY:
Mentioned: 345.
POND, DR. ARLINGTON:
Mentioned: 111, 112.
Report of; 112, 113.
PRESCRIPTIONS:
Number filled: 170.
Number filled at municipal dispensaries: 150.
PRESTON, A. P., secretary-treasurer, board dental examiners:
Report of: 201–203.
PROSTITUTES:
Report of inspections: 171.
PUBLIC LANDS:
See Lands, Public.
PUBLIC LANDS, BUREAU OF:
Homestead applications, number of; 36, 37.
Report of: 379-390.
Appropriations and expenditures: 388.
Drafting: 385.

PUBLIC LANDS, BUREAU OF—Continued.
Report of—Continued.
Friar lands -
Administration of: 381.
Estates, name of: 381.
Leasing of: 382.
Purchase price: 381.
Purchases: 380, 381.
Rents collected: 383.
Subdivision of: 384.
Surveys: 383.
Lands, public, applications for: 379, 380.
Coal claims: 380.
Free patent: 380.
Homesteads: 380.
Mining claims: 380.
Sales: 380.
Mining claims, applications for surveys: 384, 385.
Personnel: 388, 389.
Recommendations: 389, 390.
Naturalization of soldiers and sailors: 389.
San Lazaro estate—
Bilibid prison, enlargement of: 388.
Blocks: surveys of: 386.
City stables, ground rent: 397.
Constructions and improvement of streets: 385, 386.
Drainage: 386.
Fires: 386.
Litigation: 387.
Public water-closets: 386.
Revenues: 388.
Vacant lands, disposition of: 388.
Water supply and lights: 386.
Taxes: 387.
Spanish land titles, number examined and entered: 385.
(See also LANDS, PUBLIC.)
PUBLIC PLACES:
Sanitation, maintenance of: 80.
PUBLICATIONS: 442.
Journal, containing: 32.
PROVINCES:
Cholera, combating: 7, 64.
PROVINCIAL BOARDS OF HEALTH. (See HEALTH, PROVINCIAL BOARDS OF.)
QUARANTINE LAWS:
Application of: 101.
QUARANTINE SERVICE:
Aid to other services: 15.
Army and Navy, assistance from: 14.
Battle ship *Wisconsin*, disinfection of: 14.
Cargo, inspection of: 14.
Cebu quarantine station: 16.
Cost of, by whom paid: 13.
Diseases and injuries observed on vessels: 15.
Examinations made by: 15.
Leprosy, cases detected on vessels: 15.
Plague, number of cases of: 15.
Report of chief of: 213–244.
Administration: 213.
Assistance rendered other offices: 218.
Cargo; inspection of: 215.
Circular letters concerning: 226.
Cebu station -
Quarantine transactions at: 232–237.
Autopsies: 234.
Cholera: 232.
Circular letters and inspection: 234, 235.
Disinfections: 233.

QUARANTINE SERVICE—Continued.
Report of—Continued.
Cebu station—Continued.
Quarantine transactions at—Continued.
Examination of applicants for master's and engineer's licenses: 234, 235.
Fumigations: 233.
General conditions: 234.
Health conditions: 233.
Plague: 232.
Smallpox: 233.
Vaccinations: 233.
Statistics: 236, 237.
Cebu quarantine station, building and equipment: 220.
Cholera, outbreak of: 216.
Circular letters issued: 222–226.
Expenditures: 221.
Financial statement, receipts and expenditures: 240–244.
Floating equipment: 218, 219.
Health conditions: 213.
Iloilo, port of—
Quarantine transactions at: 230–232.
Autopsies: 230.
Disinfection: 230.
Fumigation: 230.
Leprosy: 230.
Sanitary condition: 230.
Smallpox: 230.
Statistics: 231, 232.
Vaccination: 230.
Immigration, condition of service: 221.
Immigrants—
Deportations: 221.
Inspection of: 220, 221.
Rejections: 221.
Interisland quarantine, establishment of: 219, 220.
Interisland shipping, committee to investigate: 219, 220
Jolo station—
Quarantine transaction at: 238, 239.
Leprosy, cases reported: 218.
Manila, port of—
Quarantine transactions at: 227–229.
Mariveles station, patients treated at: 227.
Nonquarantinable diseases encountered on vessels: 218.
Personnel: 213, 214.
Plague—
Cases reported: 216, 217.
Prevalence of: 216, 217.
Smallpox—
Cases reported: 217, 218.
Vaccinations, number of: 217, 218.
Statistics of quarantine transactions: 227–239.
Vegetables, traffic regulations: 215, 216.
Vessels—
Boarded: 214.
Disinfected: 214, 215.
Zamboanga, port of—
Quarantine transactions at: 237, 238.
Statistics: 237, 238.
Seagoing vessels, control of: 101.
Smallpox, cases found: 15.
Supervision and control of: 13.
Vaccinations by, number of: 15.
Vessels—
Disinfected, number of: 14.
Fumigation of: 14.
Vessels boarded, number of: 14.
RAMIE:
Production of: 445.

PUBLIC LANDS, BUREAU OF—Continued.
Report of—Continued.
Friar lands—
Administration of: 381.
Estates, name of: 381.
Leasing of: 382.
Purchase price: 381.
Purchases: 380, 381.
Rents collected: 383.
Subdivision of: 384.
Surveys: 383.
Lands, public, applications for: 379, 380.
Coal claims: 380.
Free patent: 380.
Homesteads: 380.
Mining claims: 380.
Sales: 380.
Mining claims, applications for surveys: 384, 385.
Personnel: 388, 389.
Recommendations: 389, 390.
Naturalization of soldiers and sailors: 389.
San Lazaro estate—
Bilibid prison, enlargement of: 388.
Blocks: surveys of: 386.
City stables, ground rent: 397.
Constructions and improvement of streets: 385, 386.
Drainage: 386.
Fires: 386.
Litigation: 387.
Public water-closets: 386.
Revenues: 388.
Vacant lands, disposition of: 388.
Water supply and lights: 386.
Taxes: 387.
Spanish land titles, number examined and entered: 385.
(See also LANDS, PUBLIC.)
PUBLIC PLACES:
Sanitation, maintenance of: 80.
PUBLICATIONS: 442.
Journal, containing: 32.
PROVINCES:
Cholera, combating: 7, 64.
PROVINCIAL BOARDS OF HEALTH. (See HEALTH, PROVINCIAL BOARDS OF.)
QUARANTINE LAWS:
Application of: 101.
QUARANTINE SERVICE:
Aid to other services: 15.
Army and Navy, assistance from: 14.
Battle ship *Wisconsin*, disinfection of: 14.
Cargo, inspection of: 14.
Cebu quarantine station: 16.
Cost of, by whom paid: 13.
Diseases and injuries observed on vessels: 15.
Examinations made by: 15.
Leprosy, cases detected on vessels: 15.
Plague, number of cases of: 15.
Report of chief of: 213–244.
Administration: 213.
Assistance rendered other offices: 218.
Cargo; inspection of: 215.
Circular letters concerning: 226.
Cebu station—
Quarantine transactions at: 232–237.
Autopsies: 234.
Cholera: 232.
Circular letters and inspection: 234, 235.
Disinfections: 233.

QUARANTINE SERVICE—Continued.
Report of—Continued.
Cebu station—Continued.
Quarantine transactions at—Continued.
Examination of applicants for master's and engineer's licenses: 234, 235.
Fumigations: 233.
General conditions: 234.
Health conditions: 233.
Plague: 232.
Smallpox: 233.
Vaccinations: 233.
Statistics: 236, 237.
Cebu quarantine station, building and equipment: 220.
Cholera, outbreak of: 216.
Circular letters issued: 222–226.
Expenditures: 221.
Financial statement, receipts and expenditures: 240–244.
Floating equipment: 218, 219.
Health conditions: 213.
Iloilo, port of—
Quarantine transactions at: 230–232.
Autopsies: 230.
Disinfection: 230.
Fumigation: 230.
Leprosy: 230.
Sanitary condition: 230.
Smallpox: 230.
Statistics: 231, 232.
Vaccination: 230.
Immigration, condition of service: 221.
Immigrants—
Deportations: 221.
Inspection of: 220, 221.
Rejections: 221.
Interisland quarantine, establishment of: 219, 220.
Interisland shipping, committee to investigate: 219, 220
Jolo station—
Quarantine transaction at: 238, 239.
Leprosy, cases reported: 218.
Manila, port of—
Quarantine transactions at: 227–229.
Mariveles station, patients treated at: 227.
Nonquarantinable diseases encountered on vessels: 218.
Personnel: 213, 214.
Plague—
Cases reported: 216, 217.
Prevalence of: 216, 217.
Smallpox—
Cases reported: 217, 218.
Vaccinations, number of: 217, 218.
Statistics of quarantine transactions: 227–239.
Vegetables, traffic regulations: 215, 216.
Vessels –
Boarded: 214.
Disinfected: 214, 215.
Zamboanga, port of—
Quarantine transactions at: 237, 238.
Statistics: 237, 238.
Seagoing vessels, control of: 101.
Smallpox, cases found: 15.
Supervision and control of: 13.
Vaccinations by, number of: 15.
Vessels –
Disinfected, number of: 14.
Fumigation of: 14.
Vessels boarded, number of: 14.
RAMIE:
Production of: 445.

RATS:
Destruction of: 84
Number caught by rat catchers: 162.
RATTAN:
Quantity taken from lands: 285
Revenue from: 288.
REDMAYNE, R. C.:
Mentioned: 293.
REED, DR. WALTER:
Mentioned: 122.
REED, WILLIAM A.:
Mentioned: 55.
RELACIONES AUGUSTINIANAS DE LAS RAZAS DEL NORTE DE LUZON:
Publication of: 55, 56.
RESINS:
Investigations: 360.
Production of: 284.
Revenue from: 288.
REYES, DR. CANUTO:
Report of: 168.
RICE:
Production of: 433, 434.
Yield per acre: 277.
RICE FARM (GOVERNMENT):
Report of: 453–455.
Improvements: 455.
Irrigation, difficulties of: 455.
Labor, abundance of: 455.
Live stock: 455.
Rice crop: 454.
Thrashing, method employed: 454.
Rice, cultivation of: 455.
Steam plowing: 454.
Cost of plowing: 454, 455.
Straw, production of: 454.
Price of: 454.
RICHMOND, THOMAS:
Mentioned: 282, 337, 360.
RINDERPEST:
Inoculation against, result of: 47–49.
Instructions relative to: 77.
Treatment of animals: 77.
ROAD TAX:
Payment by non-Christian tribes: 59.
ROOT CROPS:
Condition of: 467.
ROPE:
Tests: 437–441.
Determination of elongation before rupture: 438.
Determination of weight: 438
Methods employed: 438.
Purpose of: 438.
Results in detail: 438–440.
Tension tests: 438.
ROSARIO, RUFINO DEL:
Mentioned: 348.
ROST, DOCTOR:
Mentioned: 74.
RUEDIGER, DR. E. H.:
Mentioned: 339, 353, 361, 362.
SALEEBY, DR. N. M.:
Mentioned: 56.
SALT MINES:
Tara Island, Calamianes group: 3.
SANCHEZ, A. M.:
Mentioned: 435.
Report on growth of Sumatra tobacco: 464, 465.